

TECHNOLOGY

REVIEW *February* 1952



technology review

Published by MIT

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Typical view showing Webster Walvector ® providing heat the full window length, column to column. The steam risers and the returns are in alternate columns. Webster Radiator Valves provide shut-off of the heat in each bay.

Steam Cost 12% under estimate

The Commerce Building, first new office building in Harrisburg since 1935, is obtaining Webster Tru-perimeter Heating results with Webster Moderator low-pressure steam heating, using 12% less steam than estimated.

The Pennsylvania Power & Light Co. estimated the cost of steam for heating at \$3,527 per season. Meter readings for the first complete heating season showed steam cost of only \$3,101, less by \$426 than the estimate.

Architect William Lynch Murray specified a Webster Moderator System to assure "controlled-by-the-weather" economy in this 13-story building; Webster Walvector ® to spread the heat the full length of exposed walls.

Edward H. Bower, managing director and co-owner, says: "The continuous radiation beneath

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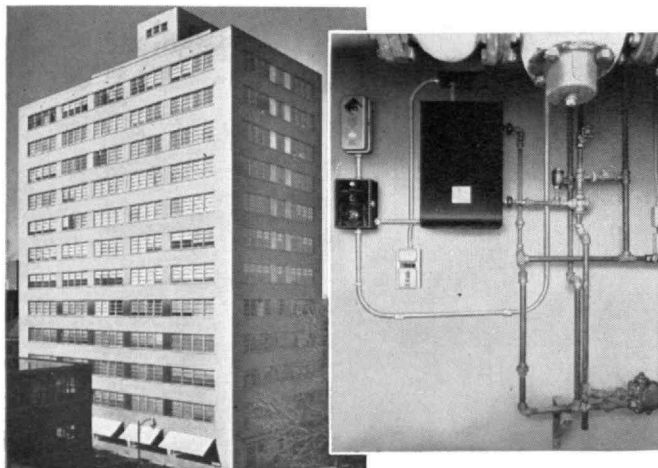
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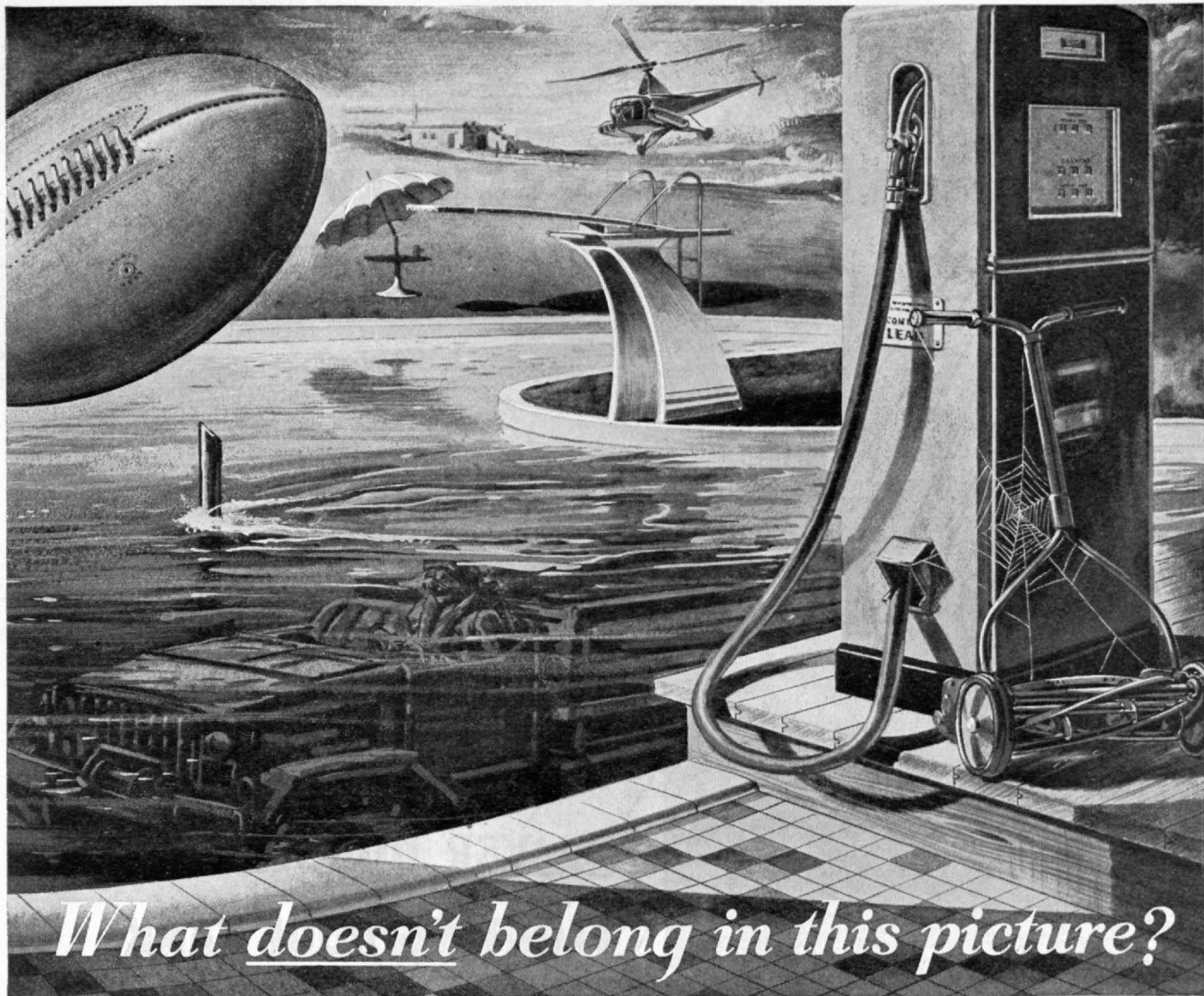
In Canada, Darling Brothers, Limited, Montreal



Commerce Building, Harrisburg, Pa. Architect: William Lynch Murray & Associates. Mechanical Engineer: Benj. A. Johnson. Heating Contractor: Herre Brothers.

Inset shows the heart of the Webster Moderator Control. Variator and Electronic Pressure Control Unit shown here operate in conjunction with the following equipment not shown: Outdoor Thermostat, motor-operated Main Steam Control Valve, and extended tube orifices installed in each Walvector ® unit.





What doesn't belong in this picture?

All but **one** of the objects in this picture have something in common—Norton or Behr-Manning abrasive products are important factors in their manufacture and in their quality. *Can you find the stranger?*

The Submarine Truck? No! True, it's out of place in a swimming pool... but hundreds of its parts were produced with the help of Norton grinding wheels and machines and Behr-Manning abrasive products.

The Tile Floor? No! Both the curb and mosaic tiles are Norton floor products... unique because they are made non-slip, even when wet, by ALUNDUM abrasive. And, like many other tiles, they were fired in kilns lined with Norton refractories.

The Gasoline in the Pump? No! As it passed through the refinery on its journey from oil well to you, Norton high temperature refractories and catalyst supports were important quality factors.

The Football? No! Many vital operations in the manufacture of leather require Norton and Behr-Manning abrasive products. For instance, drums wound with Behr-Manning coated abrasives condition the grain before coloring—rough the surfaces for secure cementing.

The stranger in the picture is the cobweb. Remember, the manufacture of any man-made product... whether of metal, wood, paper, cloth, leather, ceramics, or plastics... is dependent upon abrasives, abrasive products, refractories, or grinding machines that bear such well-known trade-marks as Norton and Behr-Manning... the world's largest manufacturers of abrasives and abrasive products.



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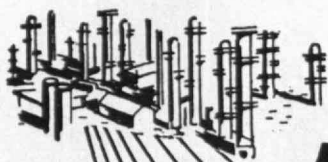
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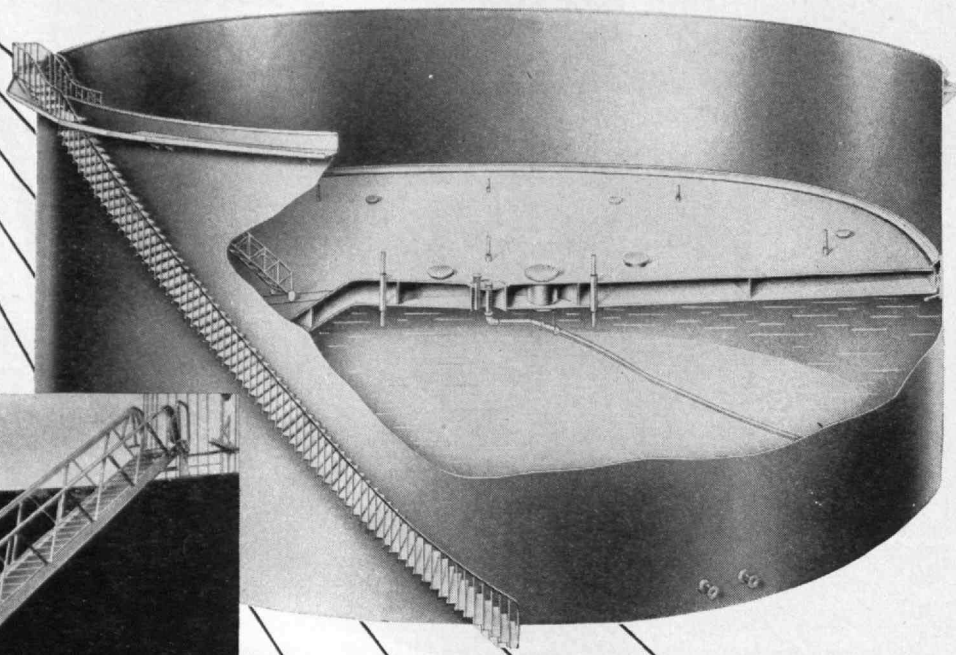
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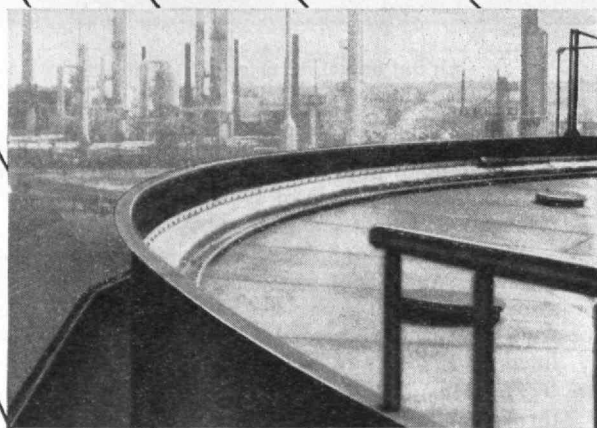


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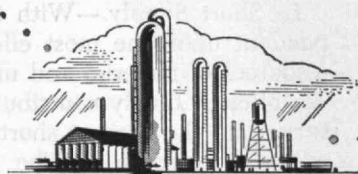
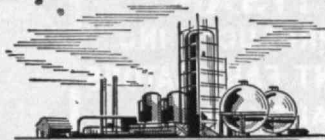
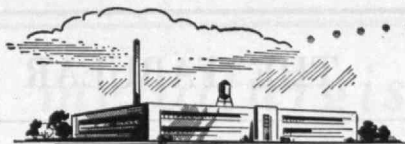
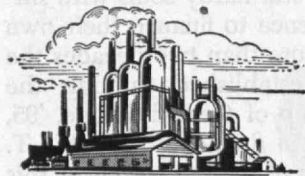
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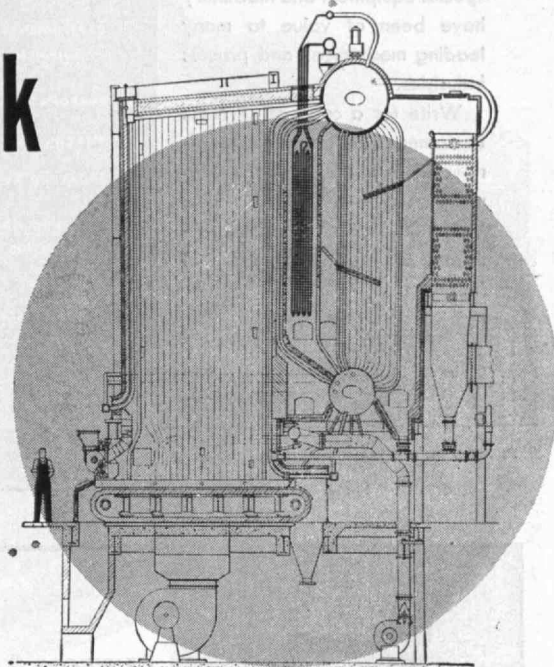
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A Chemical Company ordered two VU Boilers in 1939. In 1946 five more were ordered for three of their other plants. In 1949 two more were ordered for one of these same plants, and in 1950 two more units for a fifth plant. In 1951 three more units were ordered for still another plant—thirteen units for six plants in twelve years!

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An Electric Utility Company installed its first VU Unit in 1941. Two more units were ordered for another plant in 1947, a unit for a third plant in 1946 and still another for a fourth station in 1949.

A Refining Company ordered one VU Unit in 1937, another in 1940 and another in 1949 for one of its plants; also two in 1942 and one in 1947 for another plant.

B-486

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THE TABULAR VIEW

Pride of Independence.—In an era in which fiscal philosophy is all too commonly characterized by the search for gifts, it comes as a refreshing stimulant to be reminded that there are still hardy souls with sufficient pride and independence to finance their own collegiate education. For more than two decades the Technology Loan Fund, established through the foresight and able leadership of Gerard Swope, '95, has aided worthy students in financing their M.I.T. training. A statistical survey of the operations of this fund is given (page 181) by H. E. LOBDELL, '17, who has served as chairman of the Technology Loan Fund Board since its inception in 1930. As Dean of Students at M.I.T. and now as Executive Vice-president of the Alumni Association, Mr. Lobdell has had unique opportunities to witness the salutary effects of Technology Loan Fund operations. There is no way of assessing the character-building benefits of a program which stimulates self-reliance. But many of those who borrowed from T.L.F. for advancing their education now hold important positions of responsibility in industry, civilian government services, or the armed forces. This fact should be cause for gratification to all who have administered the fund.

In Short Supply.—With the nation's security dependent upon the most effective use of its limited resources of material and man power, PAUL COHEN, '35, offers a timely contribution (page 186) with his survey on the present shortage of engineers. As an editorial associate of The Review since 1938 and currently also engineer for the Sperry Gyroscope Company, Mr. Cohen is well acquainted with the problem and admirably equipped to discuss its seriousness. A substantial portion of Mr. Cohen's article deals with the role which American colleges can play in alleviating our present man-power deficiency through research. In this he makes extensive use of statistical studies supervised last summer at M.I.T. by John I. Mattill, Assistant Director, News Service.

Transport Helicopters.—The first of a two-part article on "The Significance of the Helicopter" by L. WELCH POGUE, appearing in the January issue of The Review, was devoted to a discussion of the versatility of the small helicopter. In this issue Dr. Pogue concludes his article (page 190) by outlining the present military uses and the anticipated commercial applications of transport helicopters designed to carry a load of as much as 10 tons. Prophecy is always likely to be dangerous, of course, but on the basis of the military uses of helicopters in Korea alone, there is every good reason to hope for early commercial service by transport helicopters. As this issue goes to press, Royal Air Force helicopters make the headlines as they stand by, on Britain's southwest coast, in readiness to rescue the skipper of the *Flying Enterprise*. Altogether, Dr. Pogue (whose biography appears on page 124 of the January issue) makes out a good case for the future of the helicopter.



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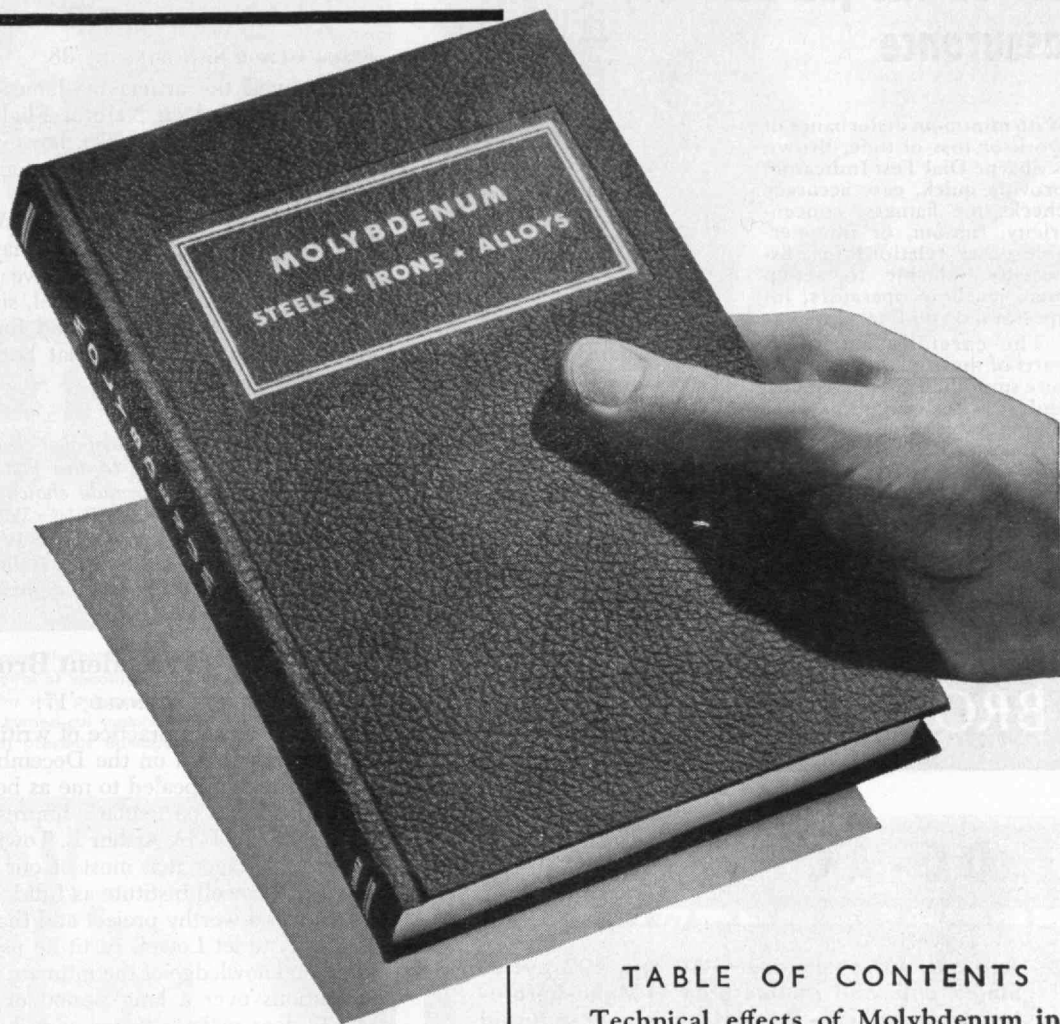
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Fundamental Effects of Heat Treatment on Microstructure.
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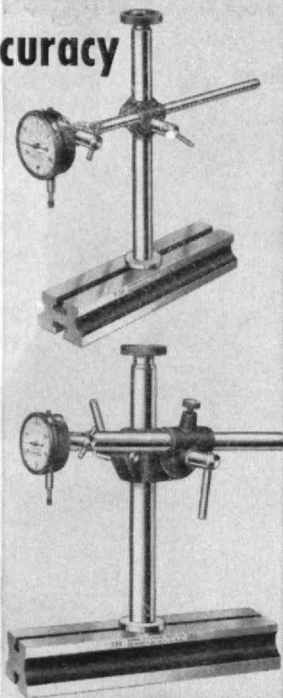
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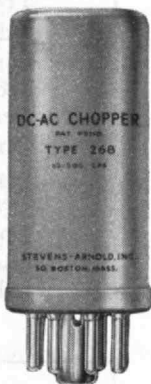
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MAIL RETURNS

Offbeat

FROM CLARK S. ROBINSON, '38:

I enjoyed the article by James L. G. FitzPatrick on "Some Thoughts on Natural Flight," in the November, 1951, Review. I would like, however, to call attention to an error on page 53. The frequency of wing beating is given as

$$F = 4W^{0.833}/M$$

and it is stated that W and M may be measured in any convenient units since they have the same dimensions. Actually the units do not cancel, since W is raised to the power 0.833. From the second formula Mr. FitzPatrick gives for F , it is evident that both W and M must be measured in pounds.

Champaign, Ill.

[The sentence is a carry-over from an early draft and should refer specifically to the first powers of the weight ratio mentioned. The formula shown is a shortened form of

$$F = 4W^{1/6} \cdot W/M$$

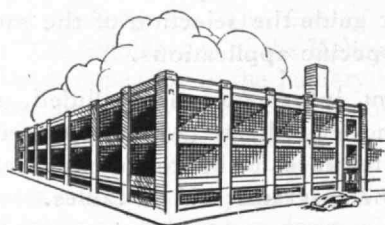
In his notes the author referred to W/M as the specific loading (L_s) and it is this alone which is dimensionless. If kilograms are substituted for pounds in the published form, the constant becomes approximately 4.8 — Ed.]

Precedent Broken

FROM FREDERICK BERNARD, '17:

I do not make a practice of writing to editors but wish to compliment you on the December, 1951, Review. All of the articles appealed to me as being of outstanding interest but I was particularly impressed with "The Lowell Institute School" by Arthur L. Townsend.

I would wager that most of our Alumni knew as little about the Lowell Institute as I did, which, in essence, was that it was a worthy project and that it was very generous of M.I.T. to let Lowell Institute use their plant facilities. I had no knowledge of the intimate relationship of the two institutions over a long period of years. It is true that M.I.T. does make a major contribution to the operation of Lowell Institute but in the early days it appears to have been a case of the tail wagging the dog.
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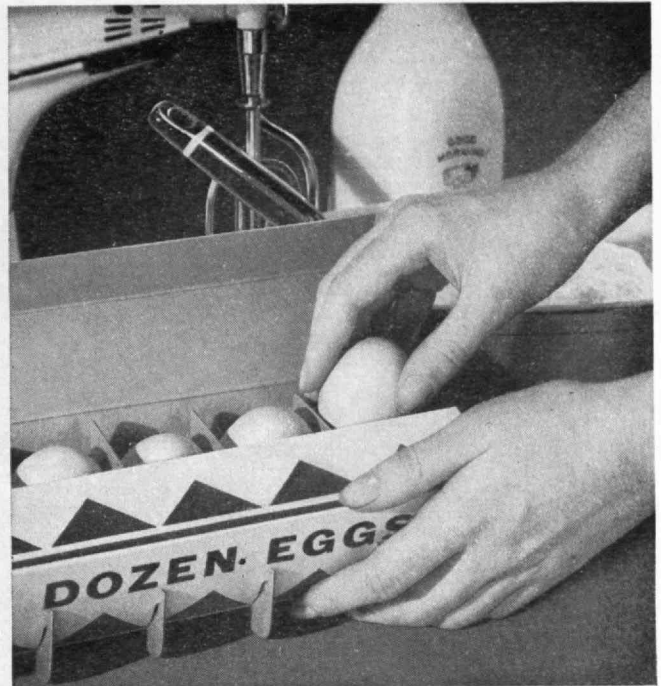
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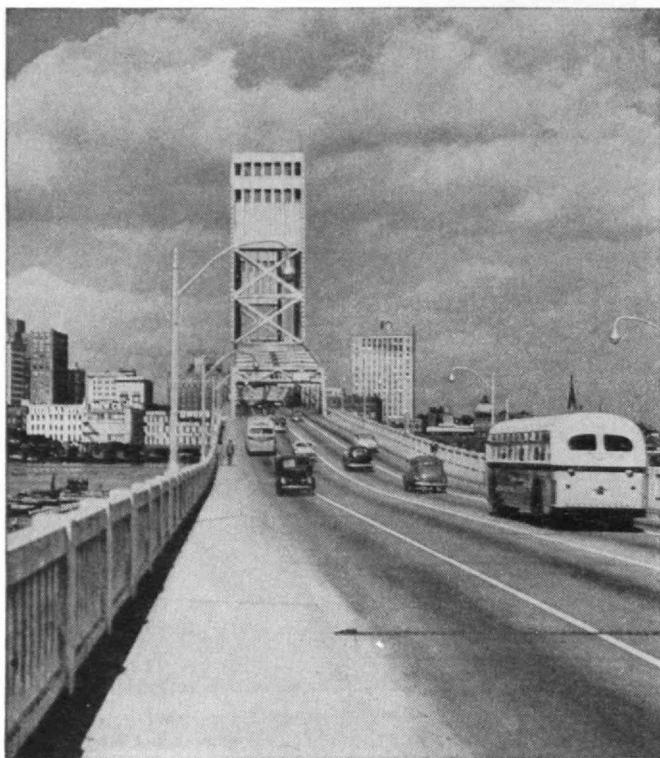


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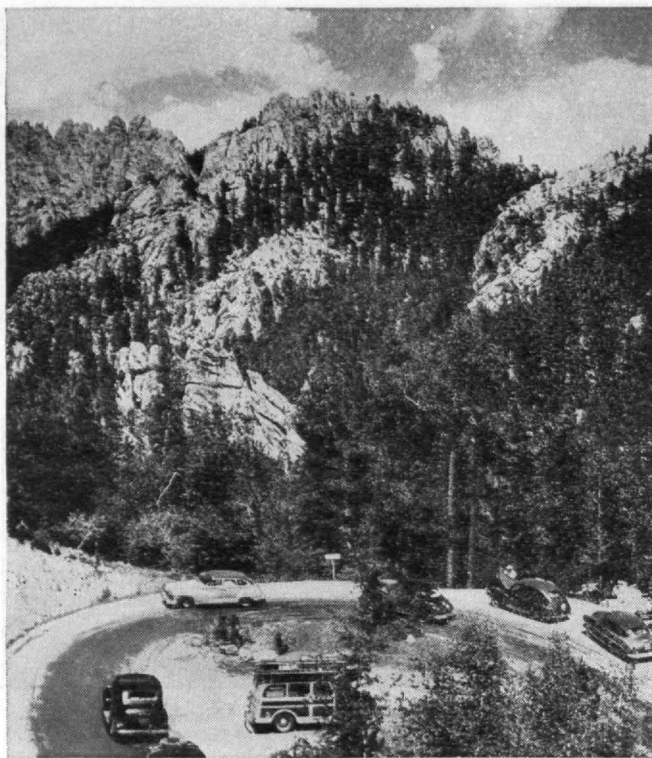
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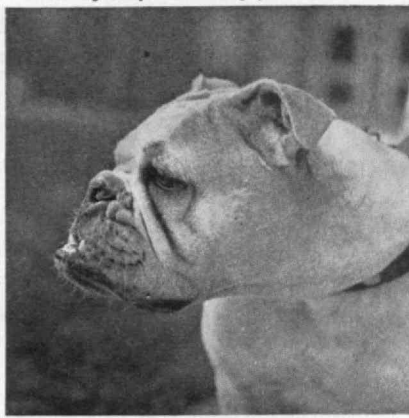
MORE COMFORT... Driving to Hood River Valley, Oregon, you'd hit some pretty rough roads. You can't always pick 'em for comfort. But you can pick your tires for comfort! Pick the tires that *absorb* the bumps and shocks. Pick the tire that's designed for a smoother ride. Pick Goodyear, as most car owners do.



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I'll never use differential equalitons."*

THE TECHNOLOGY REVIEW

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Raymond E. Hanson

Surf at Ogunquit, Maine

THE TECHNOLOGY REVIEW



Vol. 54, No. 4

February, 1952

The Trend of Affairs

Vigorous Hybrids

HYBRIDIZATION is a well-known method for breeding superior plants and animals. Broadly speaking, this procedure exploits "hybrid vigor." Such vigor may be explained on the basis that undesirable characteristics in general are recessive, and hence tend to disappear in hybrids of mixed ancestry but to show up in inbred strains of relatively pure ancestry. In practice, however, hybridization involves lengthy and tedious brother-sister matings over a period of years to produce uniform strains with stable inherited characteristics. Then follows the discarding of strains showing undesirable features. Next, the good strains are laboriously crossed (hybridized) to make a mixed strain having all of the desired characteristics and none of the bad ones. This procedure amounts to taking apart the heredity of the plant or animal, discarding the weak parts, and then reassembling the remainder. A terminal difficulty in hybridization results from the fact that hybrids do not breed true to type; hence, the several phases of hybridization must be repeated every time a new generation is to be produced.

A simplified account of the prototype of successful hybridization, hybrid corn, will perhaps serve to make tangible the foregoing somewhat abstract description.

After years of inbreeding by fertilizing plants with their own pollen, the necessary genetically stable strains of corn were produced. For purposes of illustration, let us say that these comprised four different corn types possessing, respectively, a strong stalk, a tall stalk, large ears, and the desired kernel. Each of these pure strains totally lacked the other three desired features. At the outset, the strong-stalk variety was crossed with the one having tall stalks, to make a corn with tall, sturdy stalks. At the same time, the large-ear type was hybridized with the corn having superior kernels, thus effectuating a combina-

tion of these two features. Finally, to make each year's crop of seed, the two foundation corns were crossed. The resultant hybrid corn was thus a resynthesis of everything corn should be.*

The advantages of hybridization, proven with corn, have been steadily extended to other plant crops including wheat, and then to domestic animals, such as the chicken. But now comes the surprising announcement that superior forest trees are being developed by hybridization. This turn is unexpected because forestry is one field where nature has usually been allowed to take its course. Reseeding after lumbering has usually been accomplished by merely leaving uncut a few of the original trees. Or even when seedling trees have been raised in nurseries, seed from wild trees has been used.

But now researchers in the United States Department of Agriculture are applying the proven principles of plant hybridization to pine trees. They assert that their work is in its early stages, and that disappointments and reverses, such as beset the early years of hybrid corn, may be expected. Nevertheless, a pine has been developed that, when a few years old, is twice as tall and several times as heavy as the better of its two parent strains at the same age. Such quick growth is a prime advantage for trees, provided there is no compensating loss as in timber quality or disease resistance.

Trees grown on wood lots, and sold for paper-pulp production, have for some time been a good cash crop for farmers, especially in the warmer parts of this country. Although as much as two decades may elapse before the work on tree hybridization can be completed, trees that can treble the timber output from a given area promise future added impetus to wood-lot tree raising, as well as to the controlled reseedling of denuded forest areas.

*For a more detailed account of hybrid corn, with some interesting side lights, see "Ideal By-Product," *The Technology Review*, 50:23 (November, 1947).

Simplest Atom Discovered

THE positron, or positive electron, is an "elementary" particle first observed in 1932 by Carl D. Anderson. Ample theoretical evidence is at hand to indicate that the mass of the positron is the same as that of the common negative electron or negatron, and within the limits of experimental error, this conclusion is substantiated by experiment. Both particles may be thought of as spinning on their axes.

According to theory advanced by P. A. M. Dirac, the positron bears an intimate relation to the negatron, somewhat like that which exists between an air bubble in water and a water droplet (of the same size) in air. Just as the droplet can fill the bubble, so can a positron and a negatron "annihilate" each other. In the process of such annihilation, the energy, represented by the masses of the two elementary particles, appears as electromagnetic radiation, usually in the form of two rays or quanta of equal energy which are emitted in opposite directions. Such theoretical predictions are completely borne out by experiment. The importance of these discoveries to atomic physics was recognized by the awards of Nobel prizes to both Anderson and Dirac.

Because these particles are rarely found in nature, the properties of positrons are not easily studied in the laboratory. Theoretically, the average lifetime of a positron in solid materials is predicted to be about 10^{-10} second; in gases at ordinary pressures the lifetime is extended to about 10^{-7} second. The latter figure was first verified experimentally in 1949 in the Institute's Laboratory for Nuclear Science and Engineering by Professor Martin Deutsch, '37, and James W. Shearer, 6-45, of the Department of Physics. Positrons can be observed only during a brief time interval after their creation in some nuclear or other high energy process. Nevertheless, it has long been considered very desirable to investigate, as thoroughly as possible, the forces acting between positrons and negatrons, because detailed knowledge of the forces between such particles is closely linked with our basic concepts concerning the nature of electrons and the electromagnetic field.

In the past, the forces between positrons and electrons have been investigated by letting a stream of positrons impinge on a thin foil and observing the angular distribution of the particles scattered by such impact. A statistical analysis of a very large number of encounters is required to get even moderate accuracy in determining the forces involved.

Much better precision can be obtained when the two particles describe closed orbits and form a bound system. Basic principles of atomic physics tell us that the orbits of the particles will be exactly the same every time such a structure is formed. At most, the system may exist in a few easily distinguishable modifications. The orbits and all other properties of such bound systems or atoms can be calculated with great accuracy when the forces are known. The calculations can then be accurately tested by experiment. The best known bound systems of this kind are hydrogen atoms.

Since the positron has the same charge as a hydrogen nucleus it should be able to combine with an

electron to form a system very much like a hydrogen atom. This was first pointed out in 1936 by E. Ruark, who proposed the name "positronium" for this hypothetical atom. Considerable theoretical work was done on the expected properties of positronium by a number of American, French, Russian, Norwegian and Swedish authors, but until recently no experimental evidence for its existence had been found.

During the last few months, this elusive atom has been found experimentally, and its properties have been studied by Professor Deutsch and Everett P. Dutil, '50, in the Department of Physics. Positronium is formed whenever positrons are stopped in any gas. Positronium can be formed in two modifications. The para-positronium form, in which the two spins are opposed, lasts only 10^{-10} second but the ortho-positronium, in which the two spins are parallel, survives for about 10^{-7} second. At M.I.T. the lifetime of the ortho-positronium was measured directly by electronic means and the results gave a clear agreement with theoretical results.

The second important property of positronium, which has been studied at M.I.T., concerns the behavior of this atom in a magnetic field. Theoretical considerations show that ortho-positronium should be converted to para-positronium by a strong magnetic field. The rate of conversion is a sensitive test of the forces acting between the particles at short distances. The large electromagnet, designed by Professor Francis Bitter, was used to perform these experiments, and the conversion was detected by observing the change in wavelengths of the emitted gamma rays. The results show very clearly the existence of a force, predicted by Dirac's theory, which would not be present if electron and positron were unrelated particles.

Properties of Refractories

NEW experimental data recently obtained at the Institute add to the storehouse of knowledge regarding the thermal properties of certain refractory materials. In a program of research sponsored by the Atomic Energy Commission and conducted by Frederick H. Norton, '18, Professor of Ceramics, and William D. Kingery, '48, Assistant Professor of Ceramics in the Department of Metallurgy, values of thermal conductivity of beryllia (BeO), mullite ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$) and zirconia (ZrO_2), and other refractory oxides have been measured for temperatures up to 1,300 degrees. A few preliminary values of thermal conductivity have also been determined for temperatures as high as 1,800 degrees C. In addition, values of the thermal conductivity of Al_2O_3 and MgO , and others have been determined from room temperatures to 500 degrees C.

The effect of porosity on thermal conductivity is a major problem requiring solution before the data on thermal conductivity of pure materials can be applied to manufactured refractories. The development of a theory of the effect of pores and porosity on thermal conductivity that is amenable to experimental verification has been completed by Arthur L. Loeb of the Institute's Division of Industrial Cooperation, as the initial phase of this problem.

T.L.F. Survey

An Assessment of the Results of the First 21 Years of the Technology Loan Fund, Made with the Co-operation of 1,799 Alumni Who Borrowed and Repaid a Total of \$1,175,644

By H. E. LOBDELL

DURING the booming latter 1920's, with a prescience that, in retrospect, appears to have been truly remarkable, Gerard Swope, '95, persuaded 17 others to join him in making possible a test of a pioneer idea in educational financing. It was his feeling that an institution such as M.I.T. might continue to meet its future capital needs for buildings and equipment from gifts and bequests, but it properly should expect students to pay a tuition fee more nearly commensurate with the cost of their education to provide for ever-mounting operating needs, especially for Faculty and staff salaries.

At that time, the Institute's direct annual cost of instruction was estimated as being between \$700 and \$900 per student, and its annual tuition fee, which for some time had been \$400, was about to be raised to \$500 as of 1931-1932. But, as Dr. Swope pointed out, "to increase tuition without at the same time making provision for students who have not sufficient means to take advantage of the education offered by the Institute, would be tragic."

Such provisions could be made through adding to the existing scholarship funds, he recognized. But since only the income thereof would be available annually for student aid, a large amount of additional capital would be required to meet the situation effectively by this method. If, however, the same amount of additional capital were used to establish a loan fund, both principal and its income would be available immediately for the benefit of students.

Moreover, awards from the annual income of scholarship funds were granted customarily as outright gifts, and hence any further building up of the Institute's resources for aiding students by this method, as time went on, could not be accomplished through reliance upon anticipated reimbursements from past beneficiaries. By contrast, the recipient of an award from a loan fund assumed a definite obligation to repay his borrowings with interest, for, in effect, he was simply postponing his own payment for his education from the student period, when his earning capacity was low, to a later period when, as an alumnus it would be higher.

Dr. Swope, therefore, advocated the creation of a large loan fund to which any M.I.T. student in good academic standing would be eligible to apply for loans equivalent to three years' tuition, or four years' if he continued for graduate work. Loans were to bear interest at 2 per cent from the time negotiated, and

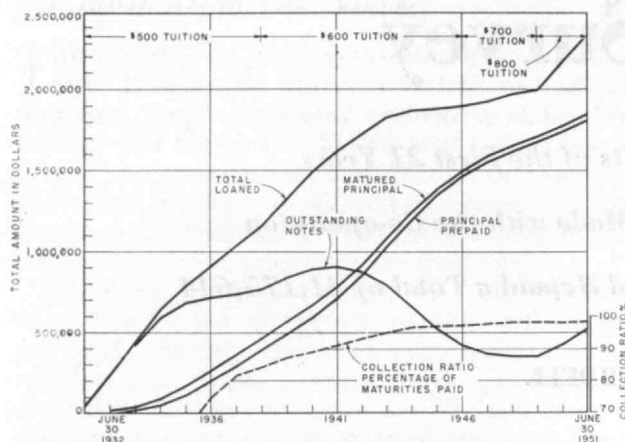
repayments on principal were to be scheduled at a rate of \$50 every six months following the expected date of graduation.

This proposal called for making loans to students on a scale hitherto unprecedented in educational circles. To implement the idea, subscriptions totaling \$4,200,000 and payable over a 10-year period were underwritten by Dr. Swope himself, aided by William E. Nickerson, '76, Coleman du Pont, '84, Charles A. Stone, '88, Edwin S. Webster, '88, Frank L. Dame, '89, Pierre S. du Pont, '90, Charles Hayden, '90, Charles Neave, '90, Albert G. Davis, '93, Frank W. Lovejoy, '94, Alfred P. Sloan, Jr., '95, Franklin A. Park, '95, Irene du Pont, '97, William C. Potter, '97, Lammot du Pont, '01, John E. Aldred, and George Eastman. In addition to these underwriters, further contributions to the fund were made by Harry J. Carlson, '92; William R. Kales, '92; Eugene H. Clapp, '95; Edward L. Hurd, '95; William Endicott, and W. Cameron Forbes.

Thus the Technology Loan Fund — the "T.L.F." for short — came into operation in the autumn of 1930, responsibility for receiving applications and approving loans being entrusted to a Loan Board composed of Karl T. Compton, then President of M.I.T., now chairman of the Corporation; Horace S. Ford, then Bursar of M.I.T., and Treasurer from 1934-1950; James L. Tryon, Director of Admissions at M.I.T., 1930-1936; Delbert L. Rhind, then Assistant Bursar and now Bursar of M.I.T.; and H. E. Lobdell, '17, then Dean of Students and now Executive Vice-president of the Alumni Association — the latter two being designated as secretary and chairman, respectively.*

During the initial year of 1930-1931, loans amounting to \$54,000 were made to 222 men; and by the end of three years (1930-1934), the corresponding cumulative totals were \$640,000 and 1,173. Also by then, repayments on principal had amounted to \$52,000 and \$16,683 of interest had been collected.

* Dr. Tryon served until 1936, Dr. Compton until 1949, and Mr. Ford until 1950. Their successors and others have served on the Loan Board as follows, the names being arranged in the chronological order of appointment: Professor B. Alden Thresher, '20, Director of Admissions (1936-1950); Thomas P. Pitré, Dean of Freshmen (1947-); Everett M. Baker, Dean of Students (1947-1950); James R. Killian, Jr., '26, President of M.I.T. (1949-1950); Professor Julius A. Stratton, '23, Provost (1950-); Joseph J. Snyder, 2-44, Treasurer (1950-); Professor John T. Rule, '21, in charge of the Section of Graphics and Course IX (1950-).



M.I.T. Illustration Service

CHART A — Record of Annual Transactions of Technology Loan Fund

In view of this early operating experience, it was felt that the \$1,451,000 already paid in by the 18 underwriting subscribers and six contributors gave the T.L.F. sufficient working capital for the time being; and therefore these Alumni and friends of the Institute, who had brought the T.L.F. into being, were released from their remaining pledges. At this point it is apposite to note that, by the T.L.F.'s own operations, the original capital of \$1,451,000 has since grown nearly 50 per cent, to \$2,151,191.

During the first 21 years, ending June 30, 1951, loans totaled \$2,341,517; and repayments on principal totaled \$1,811,806 — or 98.2 per cent of the amount then due to be repaid. The year-by-year record of these transactions is illustrated graphically in Chart A.

As shown in Chart B, on June 30, 1951, the \$31,478 of "maturities in arrears" included \$9,344 which had been "written off" (mostly accounts of deceased borrowers), and payments on notes totaling \$22,134 had been postponed. As an offset to the \$31,478 of maturities unpaid, interest received by the Fund up to June 30, 1951, totaled \$234,184. Thus, as shown in Chart B, by 1938 cumulative interest received more than balanced maturities then unpaid; and interest received up to 1948 provided a coverage of over six times potential losses. Consequently, beginning with January 1, 1949, the Loan Board decided to waive the collection of interest above 1 per cent, the previous rate having been 2 per cent.

Chart C, which indicates the year-by-year rise in the number of individuals aided to 3,215, also shows the rise in the number who have completely discharged all their financial obligations toward the T.L.F. — to a total number of 2,319 as of June 30, 1951. It was to this latter group that the Board turned last autumn for data upon which to assess the results of the T.L.F. since its establishment in 1930, measured in values inexpressible through the Board's accounting figures.

Of the 2,319 who had fully repaid their loans, 80 were deceased, and adequate current addresses were lacking for 81. Inquiries were directed to the remaining 2,158, seeking up-to-date information as to positions held and present salary ranges (for statistical purposes only), as well as about noteworthy medals,

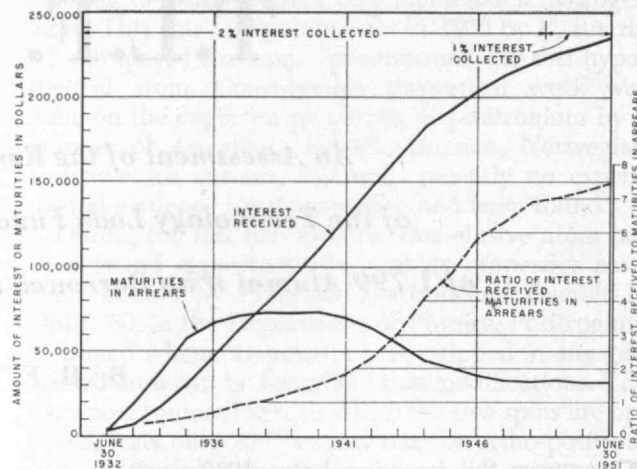


CHART B — Maturities in Arrears and Interest Received

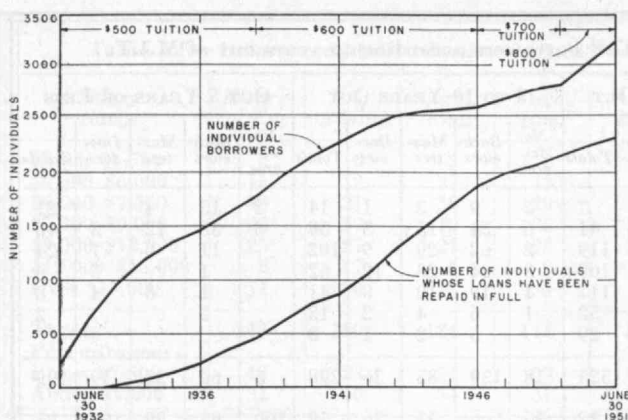
awards, or other honors achieved since leaving the Institute. By mid-December, completed data cards were returned by 1,799, or nearly 84 per cent of those queried; and of these 1,799, 1,738, or nearly 97 per cent, recorded a salary range.

The 2,319 were invited to supplement return of the above-mentioned data by giving "any reflections . . . as to the Institute's policy in respect to maintaining the Fund," and by expressing any opinions they held as to how its operation might be improved. As a consequence, data cards returned by 249, or nearly 14 per cent of the 1,799, were accompanied by messages or letters, many of which contained constructive suggestions greatly appreciated by the Loan Board. It is to be regretted that space limitations preclude quotation herein from these interesting and encouraging communications, which indicated in no uncertain terms that the overwhelming majority of those writing look back with unusual satisfaction upon having in part financed their education through the T.L.F. Only five of the 249 took occasion to complain about the Board's operating methods: three as to how loans were made, and two as to methods of making collections.

Inasmuch as nearly 39 per cent of the 1,799 answering the query saw service in the armed forces during World War II, it is not surprising that 64 decorations arising from such service were reported. The 59 given by the United States were: Silver Star, 1; Legion of Merit, 13; Distinguished Flying Cross, 3; Bronze Star, 22; Air Medal, 4; and Commendation Ribbon, 16. The five given by foreign governments were: a British Distinguished Flying Cross and an O.B.E.; an Italian Medal for Valor and a Knight Officer Cross of the Order of the Crown of Italy; and a Haitian *Légion d'honneur*.

Further decorations arising from civilian war service numbered 14, including: Medal for Merit, two; Medal of Freedom, two; Presidential Certificate of Merit, two; other awards or commendations by American military or naval authorities, seven; and to one man, His Britannic Majesty's Medal for Service in the Cause of Freedom.

But the 42 notable postwar distinctions are as impressive as the 78 mentioned above, namely: honorary doctorates have been conferred on three men (two in



M.I.T. Illustration Service

CHART C — Number of Individuals Aided by Technology Loan Fund

Engineering and an LL.D.); nine have won fellowships (including two Guggenheims, two National Research, and a Fulbright); four have been signally honored by industry (including a Vail Medal and a Coffin Award); three "development" awards from the Navy are reported; three men have been cited for exceptional or superior service (by the Departments of State, Commerce, and Agriculture); two have been Rhodes Scholars; and on one man Bolivia has bestowed its Grand Cross of the Condor of the Andes. Moreover, although less than 1 per cent of the 1,799 are more than 20 years out of the Institute, 17 have been honored publicly already by scientific and professional bodies. This group of 17 includes medalists of the American Society for Metals (the Henry Marion Howe [71] Medal), American Society of Civil Engineers (Rickey), American Foundrymen's Society (Simpson), Engineering Institute of Canada (Lionard), Franklin Institute (Longstreth), Boston Society of Civil Engineers (Desmond Fitzgerald); and a recipient of the Swedish King Gustav V Gold Medal for Architecture.

Geographically by census divisions, the Middle Atlantic leads with 557, or 31 per cent of the 1,799. New England has 546, or 30.6 per cent; North Central, 226, or 12.5 per cent; South Atlantic, 192, or 10.6 per cent; Pacific, 125, or 6.9 per cent; South Central, 104, or 5.8 per cent; and Mountain, 30, or 1.6 per cent. The remaining 19, or 1 per cent, comprise 10 in Canada and 9 overseas: 4 in U.S. Territories, and one each in Bermuda, England, Guatemala, Holland, and Lebanon.

By states, Massachusetts with 415, or 23 per cent of the 1,799, is first. Next to Massachusetts, the 10 leading states are: New York with 269, or 15 per cent; New Jersey, 161, or 9 per cent; Pennsylvania, 127, or 7 per cent; California, 96, or 5.3 per cent; Connecticut, 82, or 4.6 per cent; Ohio, 69, or 3.8 per cent; Illinois, 59, or 3.3 per cent; Maryland, 54, or 3 per cent; Texas and Virginia, each with 46, or 2.6 per cent. Three states — Idaho, Nebraska, and North Dakota — have only one of the 1,799; and 3 others — Nevada, South Dakota, and Wyoming — have none.

The distribution of the 1,799 according to highest M.I.T. degree attained, and showing the amounts borrowed and repaid, follows as Table I:

Table I — Over-all statistics of Technology Loan Fund

M.I.T. degree status	Number	Percentage	Total amount borrowed and repaid	Average per capita loan
No degree	118	6.6	\$ 47,013	\$398
Bachelor's	1,059	58.8	\$ 751,241	\$709
Master's	476	26.5	\$ 294,732	\$620
Doctorates	146	8.1	\$ 82,658	\$566
Totals	1,799	100.0	\$1,175,644	\$654

The distribution of the 1,738, who recorded a salary range (96.6 per cent of the 1,799), according to the number of years of experience, follows as Table II.

Table II — Median salary according to experience

Years out	Number	Percentage	Median salary range
Over 15*	806	46.4	\$9,000–\$12,000
10 to 15	525	30.2	\$7,500–\$ 9,000
5 to 10	298	17.1	\$6,000–\$ 7,500
5 or less	109	6.3	\$4,500–\$ 6,000
Totals	1,738	100.0	\$7,500–\$ 9,000

*Less than one per cent out more than 20 years.

The distribution of these 1,738 according to salary ranges follows as Table III, and for convenience of reference the percentages below and above the median salary range (\$7,500–\$9,000) of the entire group of 1,738 are shown for each subdivision:

Table III — Salary distribution of TLF borrowers

Salary Range	No degree	Bachelors	Masters	Doctors	Totals	Percentages
Under \$4,500	8	35	9	1	53	3.1
\$4,500–\$6,000	22	133	55	7	217	12.5
\$6,000–\$7,500	18	250	82	31	381	21.9
\$7,500–\$9,000	23	234	117	33	407	23.4
\$9,000–\$12,000	22	204	98	42	366	21.0
\$12,000–\$15,000	10	85	52	14	161	9.3
Over \$15,000	10	84	49	10	153	8.8
Totals	113	1,025	462	138	1,738	100.0
Percentages:						
Below \$7,500	43	41	32	28	38	
Above \$9,000	37	36	43	48	39	

A detailed breakdown of the data presented in Tables II and III appears in Table IV, on the basis of which it is possible to make certain comparisons qualitatively with data given in the "1950 Annual Survey of Professional Scientific Salaries," issued by the Personnel Department of the Los Alamos Scientific Laboratory in New Mexico. The Los Alamos studies, in which a total of 182 organizations participated, embrace average salaries for 27,273 professional scientific personnel employed in 232 individual research and development laboratories operated by private industrial concerns, government departments and agencies, Atomic Energy Commission contractors, research institutes, and private consulting firms.

In the Los Alamos studies no distinction is made between men with the bachelor's and master's de-

Table IV — Distribution of salary ranges of 1,738 TLF borrowers according to years out of M.I.T.

Salary Range	OVER 15 YEARS OUT					10 TO 15 YEARS OUT					5 TO 10 YEARS OUT					OUT 5 YEARS OR LESS				
	No degree	Bachelors	Masters	Doctors	Totals	No degree	Bachelors	Masters	Doctors	Totals	No degree	Bachelors	Masters	Doctors	Totals	No degree	Bachelors	Masters	Doctors	Totals
Under \$4,500	3	7	1	..	11	1	4	2	..	7	2	9	2	1	14	2	15	4	..	21
\$4,500-\$6,000	11	41	18	..	70	2	28	10	1	41	6	34	15	3	58	3	30	12	3	48
\$6,000-\$7,500	6	94	28	8	136	10	83	19	7	119	2	62	29	9	102	..	11	6	7	24
\$7,500-\$9,000	14	118	45	2	179	6	91	49	14	160	3	24	23	12	62	..	1	..	5	6
\$9,000-\$12,000	14	115	59	12	200	4	69	26	18	117	4	19	10	8	41	..	1	3	4	8
\$12,000-\$15,000	4	58	28	4	94	5	19	20	8	52	1	6	4	2	13	..	2	..	..	2
Over \$15,000	8	69	34	5	116	2	10	13	4	29	..	5	2	1	8	..	..	..	..	..
Totals	60	502	213	31	806	30	304	139	52	525	18	159	85	36	298	5	60	25	19	109
Percentages:																				
Below \$7,500	33	28	22	26	27	43	38	22	15	32	56	66	54	36	58	100	93	88	53	85
Above \$9,000	43	48	57	68	51	37	32	43	58	38	28	19	19	31	21	..	5	12	21	9

Table V — Comparisons of salary ranges of TLF borrowers and average salaries for scientific personnel

Years out	BACHELORS AND MASTERS		DOCTORS	
	Median Range for M.I.T.	Los Alamos averages	Median Range for M.I.T.	Los Alamos averages
Over 15	\$9,000-\$12,000	.....	\$9,000-\$12,000	.....
16 and 20	.....	\$6,408-\$7,092	.....	\$7,596-\$8,232
10 to 15	\$7,500-\$9,000	.....	\$9,000-\$12,000	.....
11 and 15	.....	\$5,796-\$6,348	.....	\$6,816-\$7,500
5 to 10	\$6,000-\$7,500	.....	\$7,500-\$9,000	.....
6 and 10	.....	\$4,728-\$5,640	.....	\$5,504-\$6,564
5 or less	\$4,500-\$6,000	.....	\$6,000-\$7,500	.....
5	.....	\$4,488	.....	\$5,520

grees, and hence the data shown for these two groups in Table IV have been combined for the purposes of Table V which appears above.

Tables VI and VII, which appear on page 185, show the distribution of the 1,025 bachelors who recorded a salary range (1) according to their undergraduate courses, and (2) by census divisions. These data seem to suggest that one derives comparative financial advantages from having pursued Courses XV, XVI, or III; and from having located in the Middle Atlantic, North Central, or South Central census divisions. (At the risk of redundancy be it noted that the South Central census division includes the sovereign state of Texas.)

According to "What They Do," the 1,799 may be grouped conveniently under 17 main headings, seven of these being nonindustrial and 10 industrial. Included under the first seven nonindustrial headings are 739, or 41.1 per cent of the 1,799, distributed as follows:

1. **EDUCATION**, 120 (6.7 per cent of the 1,799):
 - 110 hold professorial rank or instructorships in 56 universities, including 30 on the staff of M.I.T. Of these 110, 7 are department heads, 17 full professors, 32 associate professors, and 29 assistant professors.
 - 10 are in secondary school teaching.
2. **NATIONAL MILITARY ESTABLISHMENT**, 118 (6.5 per cent):
 - 47 of commissioned rank: 20 in the Army, 14 in the Navy, 11 in the Air Force, and 2 in the Marines. Of these 47, 3 are colonels, 19 lieutenant-colonels

or commanders, 11 majors or lieutenant commanders, 10 captains or lieutenants, 1 first lieutenant, 1 lieutenant (junior grade), and 2 second lieutenants.

- 41 in civilian capacities with the Department of the Navy, including: Bureau of Ordnance, 9; Office of Naval Research, 7.
- 23 in civilian capacities with the Department of the Army, including: Ordnance Department, 5.
- 7 in civilian capacities with the Department of the Air Force.
3. **OTHERS WITH GOVERNMENT**, 89 (5.0 per cent):
 - 67 in the services of the United States, including: Atomic Energy Commission, 13; Weather Bureau, 8; National Advisory Committee for Aeronautics, 6; Geological Survey, 6; Public Health Service, 5; Bureau of Standards, 5.
 - 22 in the service of states and municipalities.
4. **SELF-EMPLOYED**, 119 (6.6 per cent):
 - 47 owners or partners in businesses; 26 architects; 17 consulting engineers; 9 practicing physicians.
5. **EMPLOYED PROFESSIONALLY**, 189 (10.5 per cent)
 - 82 by consulting or management firms, including: Jackson and Moreland, 9; Arthur D. Little, Inc., 6.
 - 22 by architects.
 - 85 in research laboratories, including: M.I.T. Division of Industrial Cooperation, 20; those of other educational institutions or foundations, 18.
6. **MERCANTILE**, 20 (1.1 per cent)
7. **UNCLASSIFIED**, 84 (4.7 per cent)
 - including, editors or writers, 8; banking and finance, 6; graduate students, 6; agriculture, 5;

Table VI — Salary range distribution of 1,025 bachelors according to their undergraduate courses

Salary Range	Electrical Eng.	Eng. Admin.	Chem. Eng.	Mech. Eng.	Aero. Eng.	Civil Eng.	Physics	Metal-lurgy	Naval Arch.	Other Courses	Totals
Under \$4,500	6	6	3	2	4	1	1	..	1	11	35
\$4,500-\$6,000	15	12	27	13	7	9	10	6	3	31	133
\$6,000-\$7,500	40	21	33	29	15	23	15	13	15	46	250
\$7,500-\$9,000	38	37	19	28	20	15	8	4	8	57	234
\$9,000-\$12,000	25	27	21	28	29	10	10	17	6	31	204
\$12,000-\$15,000	8	17	9	9	10	7	6	2	5	12	85
Over \$15,000	11	20	12	5	3	8	4	3	3	15	84
Totals	143	140	124	114	88	73	54	45	41	203	1,025
Percentages:											
Below \$7,500	43	28	51	39	30	45	48	42	46	43	41
Above \$9,000	31	46	34	37	48	34	37	49	34	29	36

Table VII — Salary range distribution of 1,025 bachelors according to census divisions

Salary Range	New England	Mid Atlantic	North Central	South Atlantic	Pacific	South Central	Mountain	Others*	Totals
Under \$4,500	18	8	3	2	..	2	..	2	35
\$4,500-\$6,000	58	26	12	14	14	4	4	1	133
\$6,000-\$7,500	100	62	30	25	14	11	7	1	250
\$7,500-\$9,000	70	83	26	25	16	11	1	2	234
\$9,000-\$12,000	56	66	30	25	10	11	3	3	204
\$12,000-\$15,000	19	42	11	4	7	2	..	..	85
Over \$15,000	23	27	14	3	5	10	1	1	84
Totals	344	314	126	98	66	51	16	10	1,025
Percentages:									
Below \$7,500	51	31	36	42	42	33	69	40	41
Above \$9,000	29	43	44	33	33	45	25	40	36

*2 in Canada and 8 overseas: 3 in U. S. Territories and one each in Bermuda, England, Guatemala, Holland, and Lebanon.

clergy, 3; members of Parliaments, 2; a Group Captain in the Royal Canadian Air Force;—and the one man of the 1,799 who declares himself already to have "retired."

Included under the 10 industrial headings are 1,060, or 58.9 per cent of the 1,799, distributed as follows:

8. **MANUFACTURERS OF EQUIPMENT, APPARATUS, OR INSTRUMENTS**, 223 (12.4 per cent of the 1,799): including: General Electric, 48; Western Electric, 10; Westinghouse, 10; United Shoe, 9; American Brake Shoe, 8; M. W. Kellogg, 8; Sperry, 8; General Radio, 5; Babcock and Wilcox, 4; I.B.M., 4.

9. **CHEMICALS**, 197 (11.0 per cent): including: Du Pont, 44; Union Carbide, 18; Eastman, 16; American Cyanamid, 12; Dewey and Almy, 7; Monsanto, 6; Rohm and Haas, 6; Hercules, 5.

10. **AIRCRAFT**, 86 (4.8 per cent): including: Bell, 8; Boeing, 8; United Aircraft, 8; Bendix Aviation, 5; Grumman, 5; Lockheed, 5; Martin, 5; North American, 5; Consolidated Vultee, 4; Curtiss Wright, 4; Hughes, 4; Northrup, 4.

11. **ELECTRONICS**, 76 (4.2 per cent): including: Raytheon, 21; R.C.A., 9; Sylvania, 7; Philco, 4.

12. **PETROLEUM**, 76 (4.2 per cent): including: Standard Oil of New Jersey, 10; Soco-Vacuum, 9; Shell, 8; Standard Oil Develop-

ment, 8; Standard Oil of Indiana, 7; Atlantic, 5; Magnolia, 4; Standard Oil of California, 4; Texas, 4.

13. **NON-FERROUS MATERIALS**, 63 (3.6 per cent): including: National Lead, 5; Johns-Manville, 4.

14. **CONSTRUCTION**, 55 (3.0 per cent)

15. **UTILITIES**, 47 (2.6 per cent): including: American Telephone and Telegraph, 6; others with the Bell System, 10.

16. **FERROUS MATERIALS**, 44 (2.4 per cent): including: Bethlehem, 9; U. S. Steel, 8.

17. **MISCELLANEOUS**, 193 (10.7 per cent) including: insurance, 25; textiles, 23; shipbuilding, 20; rubber, 22 (including 6 with Goodyear); transportation, 21; paper and pulp, 19; food and beverages, 13; automotive, 13 (including 5 with General Motors and 4 with Ford); soap, 9 (including 5 with Procter and Gamble and 4 with Lever); mining and smelting, 8; leather, 5.

It is of particular interest to observe that of the 1,060 men in Industry 65 are presidents, 50 vice-presidents, 11 treasurers or comptrollers, 17 general managers, 42 directors of research or development, and 89 chief engineers, chemists, or metallurgists—totaling 274. In addition to these 274, there are 221 other executives reporting salary ranges of \$9,000 and upwards (including 58 in the \$12,000-\$15,000 range, and 49 in the \$15,000 and over range). Thus, one may reasonably conclude that at least 495, or 46.7 per cent of the 1,060 in Industry, are now occupying responsible posts in the field of industrial management.

The Shortage of Engineers

*If Our Present Military and Civilian Needs Are To Be Met,
Demands for Technically Trained Man Power Will Continue
To Exceed the Available Supply for Several Years*

By PAUL COHEN

OF the various shortages currently facing the American economy, none is potentially more serious than the scarcity of engineers. In this, the most rapidly growing profession in the nation, the present deficiency is estimated to be as high as 60,000. Moreover, it is virtually certain that the number of graduates leaving the engineering colleges during the next few years will be appreciably smaller than the demand. But such a seller's market has not always existed in engineering, nor was our society as technologically minded as it is today.

In 1900, this country possessed less than 40,000 engineers, or approximately one for every 250 industrial workers. At the turn of the century, when the nation's population was about 76,000,000, only about 8,500 were members of the major engineering societies. In 1940, when there were about 250,000 engineers in the country, or about one engineer to every 80 industrial workers, the membership in engineering societies had risen to slightly more than 80,000 and the national population was 132,000,000. Today, with a population of 152,000,000, there are about 400,000 engineers in the country, not including 175,000 scientists, and the number of industrial workers per engineer has dropped to about 60. This, then, indicates the past growth of the engineering profession, but it does not necessarily indicate future trends.

If we are to maintain our present engineering population, 7,500 engineering graduates are needed annually to replace those lost by death or retirement, according to the Bureau of Labor Statistics, and 9,000 replacements may be needed by the end of the decade. In addition, many thousands more are needed to replace those engineers who shift to other fields of work. It seems reasonable, therefore, to believe the above figures should be at least doubled if we are merely to maintain the *status quo*. But our society does not stand still; it is becoming ever more technological, and consequently requires increasing numbers of engineers even in time of peace. If provision is made for the addition of another 100,000 engineers to the profession over the next 12 years, it appears that, even in a strictly peacetime economy, some 20,000 new engineers could be absorbed annually. The impact of the rearmament program must also be taken into account, however, and when this is done, it appears that there is good need—and certainly room—for some 30,000 engineering graduates per year. On the basis of present enrollment and any fu-

ture conditions we are able to predict with reasonable accuracy, we shall fail to achieve that training objective by a very sizable margin.

The long-term trends that have created and nourished our present shortage of engineering personnel are: (1) a massive acceleration in the pace of research, both civilian and governmental, and (2) a continuing increase in the size and complexity of the nation's productive plant. Under normal circumstances, the increased demands for technical personnel to meet these needs might have been met by a corresponding natural growth in engineering education. A serious interruption in the normal flow of engineering graduates during World War II was an exceedingly important factor contributing to the present shortage. The straw that broke the camel's back, however, was the heavy defense effort that started with the outbreak of aggression in Korea. Since mid-1950, the shortage of engineers has been pronounced, and in a few fields, it has approached hysteria.

From 1942 to 1945, engineering training for able-bodied males virtually ceased in the United States. Even during a period of war, the policy of staying technical education in a country as highly industrialized as the United States had its drawbacks, but the long-term effects were truly serious. Not all countries shared our cavalier attitude toward the importance of the engineering profession during these trying years, however. Immediately after the end of World War II, there was a tremendous influx of veterans into the engineering schools, with the peak reached in 1946 when 91,000 freshmen enrolled as engineers. Since then, the size of freshman classes has been dropping steadily, with an anticipated drop in number of graduates four years later, as shown in the following table:

YEAR	NUMBER OF FRESHMEN	NUMBER OF GRADUATES
1940	33,200	15,000
1941	36,000	16,000
1945		8,000
1946	91,000	12,000
1947	57,500	21,000
1948	46,700	32,000
1949	36,500	45,000
1950	29,400	52,000
1951		38,000
1952		26,000 (estimated)
1953		20,000 (estimated)
1954		12,000-17,000 (estimated)

The number of graduates which, it is estimated, can be absorbed in the next few years varies widely, since the figures are based on assumptions of our civilian and military life which may or may not be fulfilled. Nevertheless, by any estimate one chooses to use, it is clear that the demand for engineering graduates for at least the next four to eight years will considerably exceed the supply and may do so by a factor of severalfold.

The attrition among engineering students is large, for nearly half who enroll as freshmen drop out of engineering studies before graduation. For this reason, figures on freshman enrollment bear only a rough relation to the number of engineers who will take their degrees four years later. Thus, although the graduating classes in 1949 and 1950 were large, numbering 45,000 and 52,000 respectively, they were considerably smaller than that group who initially embarked on engineering training at the end of World War II.

But even these bumper crops did not completely fill the gap produced during the war years and, to state the matter conservatively, there has been little difficulty in placing engineering graduates in the past decade. Only 38,000 engineering students graduated in 1951 when college placement offices found themselves distressingly unable to meet personnel demands. Ignoring any withdrawals for military service, only some 26,000 engineers are expected to be available in 1952 against need for 34,000 engineering graduates. Thereafter, all current estimates indicate that classes leaving engineering colleges are expected to decline over the next several years until 1954 when some 12,000 to 17,000 will earn their engineering degrees — the actual number depending upon the fraction of preparatory school students who choose the slide rule as a mark of their professional calling during the next year or so.

As the slightly larger classes of children born in the post-depression years reach college age, the number of engineering graduates may be expected to increase slowly after 1954. At least, there will be increased raw material from which to draw. No substantial improvement should be expected, however, until after 1960. It must be remembered that in the past only about one-third of all high-school graduates have shown that combination of ability, interest, and financial means that are necessary to make a college student. From this fraction must be drawn a very large percentage of all professional and brain workers who enter the economy — the lawyers, physicians, architects, editors, economists, teachers, businessmen, administrators, and so on — all of whom depend on a college training as a vital part of their education. Of the nation's adult brain workers, currently believed to number about 1,500,000, practicing engineers constitute about 25 per cent.

According to Solomon C. Hollister, Dean of the Engineering College, Cornell University, only 3 per cent of the prewar high-school graduates desired to enter engineering schools. But this percentage will have to be substantially increased to do much good.

Between 1952 and 1958, high-school graduates will average about 1,200,000 annually. Not all of these graduates (probably less than half) will enter college. Only if the engineering schools could manage to

attract 5 per cent of the graduating classes, or 10 per cent of the young men of this group — some 60,000, which now appears to be a most optimistic figure — is there even a likelihood of enough raw material to fill the needs for engineering personnel. Substantially, there are no other sources of potential engineering students. It takes about 17 years to grow a college freshman, and very little can be done to hasten the process. It takes another four years to give him a basic training in engineering. Today, postgraduate work is increasingly necessary in many fields and the educational process is, accordingly, lengthened. At present, the most serious needs in technical man power are for men with advanced degrees.

"University Research Potential"

Somewhat belatedly, government and industry have recognized the seriousness of this problem. A number of agencies — governmental, educational, and professional — are giving this matter their attention in an effort to minimize the deleterious effects of past miscalculations, so far as this may be possible. In this connection, a notable report has recently been issued by the Engineering College Research Council of the American Society for Engineering Education. At the request of the Research and Development Board, Office of the Secretary of Defense, the Council made a survey of the scientific and engineering research resources of American colleges and universities. The survey was conducted under the supervision of A. F. Spilhaus, '33, Dean of the University of Minnesota Institute of Technology. Data for the report, "University Research Potential," were compiled and edited at M.I.T. by John I. Mattill, Secretary of the Engineering College Research Council and Assistant Director of the Institute's News Service, and Jean P. Stevenson, Assistant Secretary of the Research Council. The report gives an impressive picture of the facilities in man power and equipment available in this country for engineering and scientific training. Its primary purpose, however, is to indicate where military research and development might best be expanded in American educational institutions without harm (and possibly with distinct benefit) to the teaching efforts of such institutions.

That such a study was due, becomes apparent when one takes note of the spectacular rise in research and development work in the United States since World War II. While industry has, of course, increased its already large-scale efforts in this direction, the greater portion of the rise is attributable to government-sponsored work. A series of extraordinary accomplishments in military research (perhaps development would be a more precise term) were effected during World War II. Under conditions of a true peace, perhaps the wartime research program may have reverted to a moderately expanded prewar scale. But, under the present circumstances, military and civilian policy makers alike (many of them already conditioned to respect the power of scientific research), became convinced that survival in an increasingly dangerous world depended critically on a continuous, large-scale, technical effort. Thus moderate normal growth gave way to an almost explosive expansion.

Although the total bill for government research was but \$67,000,000 in 1940, military research budgets alone, just prior to the Korean conflict, had reached an annual level of more than \$500,000,000. The current military research allotment of \$1,100,000,000 requires the services of about 56,000 research scientists and engineers and thereby absorbs about 43 per cent of the total personnel of this type available in this country. By 1952, the annual military research expenditures, including those for the Atomic Energy Commission and the National Advisory Committee for Aeronautics will be at the rate of \$1,300,000,000 or about \$8.50 per capita. In mid-1950, the Atomic Energy Commission alone employed approximately 6,400 engineers and about an equal number of scientists. It is expected that around 65 per cent of the nation's research personnel will be required for military research in 1952. When measured either in amount of money spent or in the numbers of technically qualified persons engaged, government research is truly "big business."

Engineers in College

In contrast to the concentration of technical personnel in governmental agencies, the colleges and universities of the country employ only about one engineer to every 40. All told, their staffs include about 25,000 faculty members and senior research workers in the fields of engineering and science. In addition, these educational institutions are able to call on about 27,000 instructors, junior research workers, and graduate students. With this group, which includes about 20 per cent of the nation's research personnel, the American colleges and universities were conducting about 9½ per cent of the total military research program in mid-1950, and they are expected to conduct about the same proportion of the vastly larger research totals scheduled for this year. All this military load must be accomplished without injury to the basic research programs or to their primary teaching responsibilities. Truly college professors — at least those in the physical sciences — have long ago left their ivory towers. But are their talents used as effectively and efficiently as possible?

To determine whether the country's unique human resource of university research personnel was being utilized to capacity, the Engineering College Research Council undertook a census of the specialized skills and equipment currently available in our institutions of higher learning. The survey was made by means of an elaborate questionnaire, so designed that the information in the replies could be coded and processed by punch-card equipment. Although such a procedure formalized the presentation of the data and, to some extent, restricted the type of information that could be elicited, it greatly speeded the required analysis and kept accounting errors to a minimum. Questionnaires were sent to 990 colleges and universities throughout the United States and its territories. By the closing date for reporting, over 700 schools had replied of which about 200 indicated they had no resources for the type of research indicated. The report covers statistics for the remaining institutions; 517 in all co-operated in the survey.

A principal fact that emerged from this study is that 11 institutions accounted for 50 per cent of the Federal research and development expenditures in colleges and universities over a three-year period. Funds spent by full-time research staffs, as well as by the faculty, are included in these figures. If we consider only time devoted by faculty members and senior research staff, it is found that 15 schools, controlling 20.5 per cent of the total faculty and senior research staff personnel, contribute half of the time which educational institutions give to defense projects. In these 15 schools, research occupies almost as much of the total school effort as does teaching, about three-quarters of the faculty participate to some extent in research, and currently, the bulk of research time is spent on defense problems.

The remaining half of the time which colleges and universities devote to defense research is accounted for by 510 other institutions reporting research potential. In this numerically much greater group, only 45 per cent of the faculty members are active in research, and military projects absorb 38 per cent of the total research time. Overall, the 15 universities who lead in defense research devote about one-third of their total effort in this field, whereas the remaining educational institutions devote about one-twelfth of their time to defense work. In a group of small, highly endowed, liberal arts colleges, 60 per cent of the faculty members considered qualified to do research were so engaged, but less than 20 per cent of the research time was devoted to problems of national defense.

Teaching versus Research

In the various fields of engineering and science, there are approximately 25,000 members of the faculties and of senior research staffs. Of this group, about 20,000 were considered qualified to do research, and 12,700 were actually engaged in research. The fact that approximately 8,000 capable faculty members are not engaged in research, in one or another field of science or engineering in which they have been trained, does not necessarily imply a waste of talent. There may be good reasons why it is undesirable to use every last qualified research person in our educational institutions for research investigations, for the nation needs research administrators and teachers as well as laboratory workers. But this fact does indicate that there is a significant reserve of research ability which can still be tapped.

Although hardly an unexpected conclusion, one of the points emerging from the statistics of the report on "University Research Potential" is that the ratio of students to staff varies greatly among the 517 institutions whose facilities were reported. For some schools it would seem (at least to a layman in the educational field) that a reduction in the teaching load would be a necessary preliminary to a more active role in the military research program. If student bodies continue to shrink, in accordance with present predictions, the necessary slack may be forthcoming. In any case, the report suggests some participation in research by an increased fraction of the nation's faculties might react to the betterment of engineering teaching. Still it must be remembered that teaching, rather than re-

search, is the primary function of an educational institution, and there is little to be gained by converting a good teacher into a bad research worker. It is only when research and teaching go hand in hand that we may expect extracurricular investigations to benefit tomorrow's crop of engineers and scientists through the more effective teaching which research makes possible.

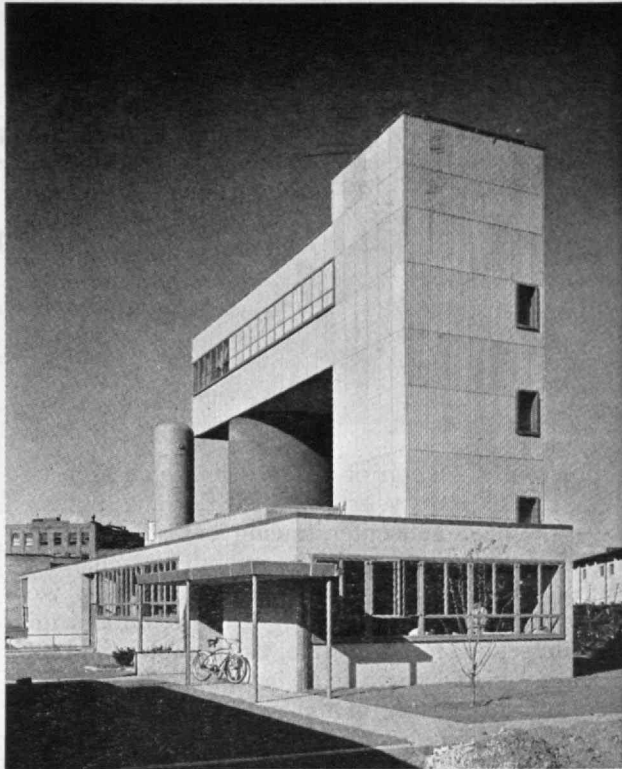
In many of the country's smaller educational institutions the number of personnel available for research is quite small, of course. Moreover, the number of fields in which these schools can claim expert knowledge in science or engineering is correspondingly limited. So, too, is the stimulation that can be obtained by the cross-fertilization of ideas which comes as a natural consequence when qualified personnel of diverse interests, or in different departments, are able to rub shoulders in a common attack on the same problem.

Problems suitable to the solitary worker and adjusted to his interests and the available equipment are undoubtedly more difficult to find than those which are best tackled by a sizable group of people with properly related skills. It is understandable that much of the military research program has tended to channel through relatively few institutions who are so large and so well equipped that virtually any problem in a broadly defined area is likely to receive adequate attention. Yet, says Dean Spilhaus, "there are a large number of defense research needs, even those lying outside the range of fundamental research in its narrowest definition, which can readily be provided in packages suitable for the small college laboratory." It is here, too, that the largest amount of unused research capacity, within the above limits, appears to exist.

Colleges and Defense Research

A broader deterrent to a more active participation by the colleges in defense research is that the ratio of personnel in the various fields of knowledge has been set over a long period of time when the determining factors in the training and choice of staff were the peacetime needs of the civilian economy and the requirements of basic research in the sciences. The field containing the largest number of faculty members and full-time senior research workers is chemistry, with a total personnel of 3,711 in all the institutions surveyed. Next in order are mathematics with 3,297 members; physics with 2,628; psychology and human resources (a field quite different from that of the physical and engineering sciences with which University Research Potential is largely concerned) with 2,432; mechanical engineering with 2,002; civil and sanitary engineering with 1,698; and so on to the smallest field reported — that of marine engineering with 78 staff members. The six largest fields, enumerated above, account for almost two-thirds of the total number (24,881) of staff members reported, and also account for 60 per cent of those considered qualified to conduct research.

Current requirements in defense research, however, are predominantly in the fields of physics, electronics, chemistry, electrical engineering, and aero-



M.I.T. Photo

Among the unusual facilities which American colleges have available for the nation's current research program are 4 betatrons, 6 synchrotrons, and 14 linear accelerators. Of the latter units, the Institute's 12-million-electron-volt Van de Graaff generator, shown above, is an outstanding example.

nautical engineering. More than 80 per cent of the research time in electronics and aeronautical engineering, and more than 70 per cent of that in electrical, marine, and metallurgical engineering is devoted to projects connected with national defense. About half of the research effort in mathematics, slightly less than half that in mechanical engineering, and about one-third that in civil and sanitary engineering is so devoted. Nearly half the military research program is in the fields of physics, chemistry, and electronics, but the colleges and universities have only about 30 per cent of their staffs in these fields.

Perhaps the most important single point disclosed by the survey is that, of approximately 8,000 faculty members considered qualified to do so, but not currently engaged in research, the great majority are in the liberal arts colleges and the smaller technical schools. More than 1,000 of these 8,000 are active in mathematics; 940 in mechanical engineering; 880 in chemistry; 775 in civil engineering; and 725 in physics. The utilization of this group of 8,000 for part-time scientific investigation would expand our present senior collegiate research personnel by 47 per cent. This is a significant increase but it is not the only string to the bow.

"Another way in which the tremendous needs for defense research may be aided, not only immediately but more particularly in the future, is by increasing the ratio of graduate students to full-time senior faculty and staff," says Dean Spilhaus. On the average,

(Continued on page 202)

The Significance of the Helicopter

II. Transport Helicopters

Commercial Helicopter Service

May Soon Be Commonplace

By L. WELCH POGUE

THE first section of this article which appeared in the January issue of *The Review*, discussed the small helicopter, tracing its historical development and pointing out its operational characteristics. The various types of small helicopters were described, and their use in agriculture, oil and mineral detection, forest service, cartography, and as a private vehicle was given. A basis for cost consideration and an account of the military applications of the small helicopter to date were included. In the concluding section in this issue, the case for the transport helicopter is presented.

Large Helicopter Types

Although few outside the industry are aware of it, because all production is now going into military hands, helicopter aerial trucks and busses are well past the experimental stage and are now in production in medium-sized form, with even larger ones just around the corner. Although some of the larger types are specially designed for a special assignment, it is nevertheless true that all are fundamentally intended for use in the transport of people and cargo. A brief catalogue of these machines, as produced chronologically, would include the McDonnell XHJD-1, the Piasecki

HRP-1, the Piasecki HRP-2, and the Piasecki HUP, the Bell-48, and the Sikorsky-55. Their cruising speeds vary as between the different models from 86 to 120 miles per hour.

The McDonnell XHJD-1* is an experimental twin-engine, twin-rotor helicopter. It is a 14-place machine with a useful load of 5,189 pounds. Built under a Navy contract and first flown in 1946, it is not in production.⁶¹⁻⁶³

The Piasecki HRP-1, HRP-2, and the H-21 are a series of machines developed for the military services on the same basic design. They are single-engine, twin-rotor machines and, depending on the seating plan, can accommodate from 11 to 21 passengers. The commercial version of the H-21, the PD-22, has a payload of 3,500 pounds. The H-21 is a higher-powered version of the HRP-2. The HUP is a slightly smaller seven-place machine with a similar configuration designed for intrafleet operations in the Navy. The HRP-1 was first flown in 1945 and first delivered to the Navy in quantity in 1947. Today many of them are in service for the Navy, Marine Corps, and Coast Guard. The H-21 is in quantity production for the Air Force as an arctic rescue ship, and the HUP is in production for the Navy as a shipboard craft.^{42, 61-65}

*Please see numbered references at end of article, page 212.



Sikorsky helicopter, bearing the Air Force designation H-19, was first flown late in 1949. It is the prototype for a later model, S-55, now in quantity production, which carries a useful load of 2,533 pounds and seats 12 persons.

The Bell-48 (known to the Air Force as the H-12) is a 12-place machine which has been flying in its production version since November, 1949. It is a single-motor machine incorporating the same rotor design principles as Bell's smaller helicopter of the 47D series. It has a useful load of 2,471 pounds. It is now in production for the Air Force.^{61-63, 66}

The Sikorsky-55, lineal descendant of the S-51, is a 12-place, single-engine, single-rotor machine first flown in the fall of 1949 as the Air Force H-19. It has a useful load of 2,533 pounds. It is now in quantity production.^{61-63, 67}

In addition to the foregoing machines, all of which have flown and all of which, except the XHJD-1 are now in quantity production, a number of other machines even more interesting from the point of view of mass transportation are in the mock-up and testing stages. Among these are the Piasecki XH-16, the Hughes XH-17, and the Bell XHSL-1.

The XH-16 is a twin-engine 40-passenger machine, comparable to the DC-4 in the fixed-wing field, which is being developed by Piasecki for the Navy and Air Force and is now in the prototype stage. An alternate configuration would provide a detachable pod or capsule, similar to that on the Fairchild C-120, utilizing the tractor-trailer principle of the highway truckers.⁶⁴

The Hughes XH-17, which has been undergoing tie-down tests, is a huge "flying crane" helicopter utilizing jet engines on a single rotor with an estimated useful load of 20,000 pounds or 10 tons.^{61-63, 68}

The XHSL-1 is a Bell design which won a recent Navy contest for a helicopter designed primarily to meet the requirements of antisubmarine warfare. Emphasizing long-range and heavy load-carrying capacity, it has a single motor, twin rotors, a configuration with a rotor fore and aft, and is now in the mock-up stage. The details of its performance are not available.^{61, 68-71}

On March 14, 1951, contracts were awarded by the Navy Bureau of Aeronautics for two large machines to meet the requirements of the Marines for an assault transport helicopter. Although all details of these machines have not been released, it is known that the Sikorsky winning design included a single five-bladed rotor with a conventional piston engine, while the McDonnell winner will have a single three-bladed jet-propelled main rotor.

Despite the inherent safety of helicopters provided by their autorotational characteristic in the event of engine failure, considerable attention has been given to the development of twin-engine machines which could maintain altitude on a single engine. Such machines would permit lower and more direct flight over crowded metropolitan areas because of the elimination of the necessity that single-engine equipment always be within gliding distance of a suitable landing spot. As noted above, the McDonnell XHJD-1 and the Piasecki XH-16 are both twin-engine machines, and all the leading manufacturers have testified that their machines were readily adaptable to twin engines and most of them are working on the project.^{72, 73} It has been stated that the application of gas-turbine engines to helicopters will greatly increase payload for the same size helicopter.⁶⁴



McDonnell helicopter XHJD-1, built for the Navy, is a 14-place machine with a useful load of 5,189 pounds. It is a twin-rotor, twin-engine helicopter.

Military Uses of Transport Helicopters

To what uses do the armed services plan to put these machines? The answer is a combination of many of the past uses of the truck, the liaison airplane, the ambulance, the glider, the parachute, the destroyer, and other surface means of transportation. Such is the versatility of the transport helicopter that it can and does perform many of the functions of each. Major General Frank A. Heileman, chief of the Army Transportation Corps, has, in fact, been quoted as saying that at last, in the helicopter the Army has found a mechanized replacement for the mule.⁷⁴

The military interest in transport-size helicopters is succinctly summed up in the following statement prepared in the fall of 1950 by the Helicopter Council of the Aircraft Industries Association:

The necessary restrictions of military security do not permit us to give details of the procurement programs of the Armed Forces. However, it can be said that helicopters are being procured in far greater quantities than ever before, and that helicopter procurement and operations constitute a much greater proportion of military expenditures and effort than they have heretofore. In fact, over five hundred helicopters already have been ordered under current production programs.

Moreover, transport-size helicopters constitute the major portion of this expanded helicopter production, both in absolute numbers and to a greater extent in expenditure of funds.

The Army officially announced on October 20, 1950 that it is forming a number of helicopter transport companies, each company to be equipped with 23 transport helicopters. The Army announcement further stated that one such helicopter company would be provided for each of the Army's divisions; this, of course, represents a sizeable number of transport helicopters. Moreover, these Army helicopter companies will be a part of the Army Transportation Corps; this fact is of the utmost significance, in that it characterizes the helicopter as a basic vehicle of transportation, placing it alongside the Army's motor transport and its railroad service.

All current Air Force procurement of helicopters is for machines of 10-place or larger size. These larger machines are being used for rescue of numbers of persons over long



The Piasecki HRP-2 tandem helicopter, bearing Marine Corps designation XM-1, is of the same basic design as the HRP-1 and H-21. All are single-engine, twin-rotor machines. Depending upon seating arrangement, from 11 to 21 passengers can be accommodated.

ranges, for the transportation of personnel and equipment, and for tactical purposes.

The bulk of the Navy's helicopter orders are for machines substantially larger than those used in today's certificated helicopter mail services. These are being produced for antisubmarine missions and for transport utility in fleet and ship-to-shore operations.

The Marine Corps is continuing and greatly expanding its use of helicopters as assault transports for troops and equipment. All of the helicopters which it is getting for this purpose are 10-place and larger.

While each of the Armed Forces undoubtedly will continue to have great use for the smaller helicopters for liaison, observation, communications, etc., it is manifestly clear that the greatest military requirements are for helicopters of transport size. The preponderance of production is that of 10-20 place machines, and the emphasis in development is upon helicopters of even larger size.⁷⁵

In addition to the military uses of the small helicopter described in a previous portion of this article, the new large machines open a wide variety of possibilities. In the field where the helicopter really came to fame in Korea — rescue and transportation of the seriously wounded directly from front-line positions to rear-area hospitals — the larger machines are obviously better adapted. In Korea the seriously wounded were carried in covered litters attached to the *outside* of the helicopters. In the big, new machines, many more injured can be carried in comparative comfort inside the machine where medical attention can be given en route. The advantages are apparent.

Prior to Korea the helicopter was perhaps best known to most of the military for its function of rescuing aviators downed at sea, in the Arctic, or in other inaccessible, but not too distant, places. The longer range and greater capacity of the newer machines make it possible to enlarge this function and to rescue in one flight the entire crew of a downed large bomber hundreds of miles from help. The Coast Guard is so using many of its large machines and the Air Force is purchasing the H-21 in quantity for the specific purpose of such rescues.⁶¹⁻⁶⁵

The movement of men and supplies to points otherwise difficult or impossible of access is a prime job for the transport helicopter. Whether this movement be from ship to shore where there are no port facilities, or where the port facilities are overcrowded or destroyed, or from a base area to inaccessible outposts on mountain tops, or across bridgeless rivers or canyons, the transport helicopter carrying 10, 20, or 40 men, or the equivalent weight in supplies, is the answer to a prayer.

The following dispatch printed in a Washington, D.C., newspaper is an example of the work of a helicopter in mountain battle:

Eastern Front, Korea, Sept. 20 (AP)—Giant helicopters lifted a company of battle-ready Marines onto a rugged mountain on the eastern front today. It was the first time helicopters have moved troops into combat. The job was done without loss of a single man or plane. It would have taken two days to climb the mountain and occupy it. But in four hours the giant (helicopters) landed a reinforced marine company and supplied it with food and ammunition. A helicopter even strung telephone lines linking the almost inaccessible hill with Marine headquarters in the rear. . . . The first six helicopters hovered about eight feet above the mountain while Marines climbed down knotted ropes. The first troops down cleared 25-foot square landing areas. The remaining 15 helicopters landed to debark their men and gear. . . . The 'copters took an average of 20 seconds to land, unload and take off again. Each helicopter made several trips. The big machines used today can carry as many as 10 men each. Maj. W. P. Mitchell . . . executive officer of the Marine helicopter squadron HMR-161, said the maneuver was relatively fast. "I think this is just the beginning of this type of warfare," he said. "It will completely change military science. We've been shooting for this for three and a half years. I'm happy to be in the outfit that is the first to do it."⁷⁶

A 10-ton helicopter can move vast amounts of supplies, ammunition, and equipment directly to the using units. This is exciting. Never has the service of supply known anything like this, but we may be sure it will use new facilities fully.

Apply the same concept to the rapid movement of completely equipped combat troops, and the transport helicopter becomes a formidable weapon. The Marine Corps was one of the first of the military services to appreciate the tactical significance of the helicopter.⁴² Consider the implications of this on the technique of the amphibious assault. Of primary importance is the element of surprise. A fleet of assault transport helicopters, alighting from offshore carriers just before dawn and proceeding at a speed of well over 100 miles an hour, can allow troops to consolidate positions long before the enemy has had an opportunity to muster a concerted defense. Alternate landing points may be selected, unaffected by the necessity of suitable beaches required by amphibious craft, leaving the final determination of a landing place until the last moment which is calculated to take the greatest advantage of the surprise element. Indeed, the sandy beach and extensive artillery preparation as used in World War II become unnecessary, because the invading troops can be landed in quantity well inland, behind the coastal defenses. With adequate fighter air support, the same technique which jumps the coast line can also jump an enemy front line and land a large element well behind the enemy lines to by-pass him or harass him from the rear. A revolution in tactics is about to occur. The Marines have been working out new techniques with a transport helicopter unit since 1948.⁶⁴ The official Marine Corps publication contains the following statement on this subject:

... The Marines of HMX-1 — Marine Experimental Helicopter Squadron at the Quantico Marine Corps Air Station — have been working out another tactical wrinkle for the "egg beaters."

The little "flying windmills" have been used at Quantico since 1948, and their training has centered around making beach assaults with a minimum of the slaughter usually attributed to old methods of amphibious attack...

It's quite likely that when Marines land from now on, it'll be from the air as well as the sea...⁷⁷

The Navy believes so firmly that the helicopter is the answer in combating the submarine that, as noted above, it has had a large helicopter designed for this particular purpose.⁶⁹ The large transport machine with its great range, its capacity for carrying large amounts of search equipment and antisubmarine weapons, and its ability to search slowly and hover near a possible target appears destined to improve greatly submarine-hunting technique at a fraction of the cost, and with a tinier fraction of the man power required by former methods.

Finally, in civil defense activities the transport helicopter looks like a natural. At the Eniwetok atomic bomb tests in 1948, helicopters were found to be a safe means of approaching the contaminated area in the immediate post-blast period and they were extensively and successfully used for this purpose.⁷⁸ A modern metropolitan area devastated by the atomic bomb would have, for some time, absolutely no other means of transporting medical and rescue personnel into the affected area, evacuating the injured, and maintaining effective liaison with the outside. In an area such as Manhattan Island, which could be completely isolated from all other means of transportation by an atomic blast, the need for such equipment is a crying one. In fact, the commander of the Eastern Air Defense Force has said that for use in such an emergency, the helicopter "would be invaluable."⁷⁹

Commercial Uses of the Transport Helicopter

In the light of all these considerations, and the fact that the ability of the helicopter to perform all of these functions has been tested and proved, it is clear why the military services have loaded down the principal manufacturers with large orders for transport-size machines.⁸⁰ All of the major helicopter manufacturers have embarked upon extensive plant expansion programs.⁵

The mere existence of such new, large transport helicopters has already had an impact on commercial

Bell helicopter, bearing the Air Force designation H-12, has been flying since November, 1949. This single-rotor machine has a useful load of 2,471 pounds.



aviation thinking and planning. When they start coming off mass-production assembly lines — a prospect which is clearly foreseeable right now—another revolution in transportation will begin.

The Civil Aeronautics Board has before it petitions from several applicants who propose to utilize these machines to carry passengers in various metropolitan areas, including New York.⁸¹ In renewing the certificate of public convenience and necessity of Los Angeles Airways, Inc., for five years, recently, the Civil Aeronautics Board authorized the carriage of passengers, in addition to mail and property, on certain of its routes.⁸² It appears, therefore, that this company will pioneer in the actual scheduled carriage of passengers in certificated operations. The company not only plans to inaugurate passenger service from the airport to the suburban communities with Sikorsky-55's, but already has plans prepared for a passenger heliport on top of a large office building in downtown Los Angeles.⁸³ It seems clear that the large helicopter is ready for safe, regular, efficient, and economical carriage of passengers.

As planned by Los Angeles Airways, the first large-scale passenger operation will probably be from airport-to-suburban communities, thus complementing the air lines and helping to solve one of their terminal time-delay problems. Speedways have generally been built to serve the suburban-to-downtown trips, not suburban-to-airport journeys. Hence, one of the helicopter's great contributions will be in spinning out its own speedway to the airport in the lower levels of air, above the congested traffic below, and beneath the flight paths of the fixed-wing transports.

Next, when adequate heliports in downtown areas are available, the operation from airport to downtown, and reverse, will offer a large business. But that cannot come until there are enough heliports available at travel transfer points to make possible competition with the limousines and taxis.

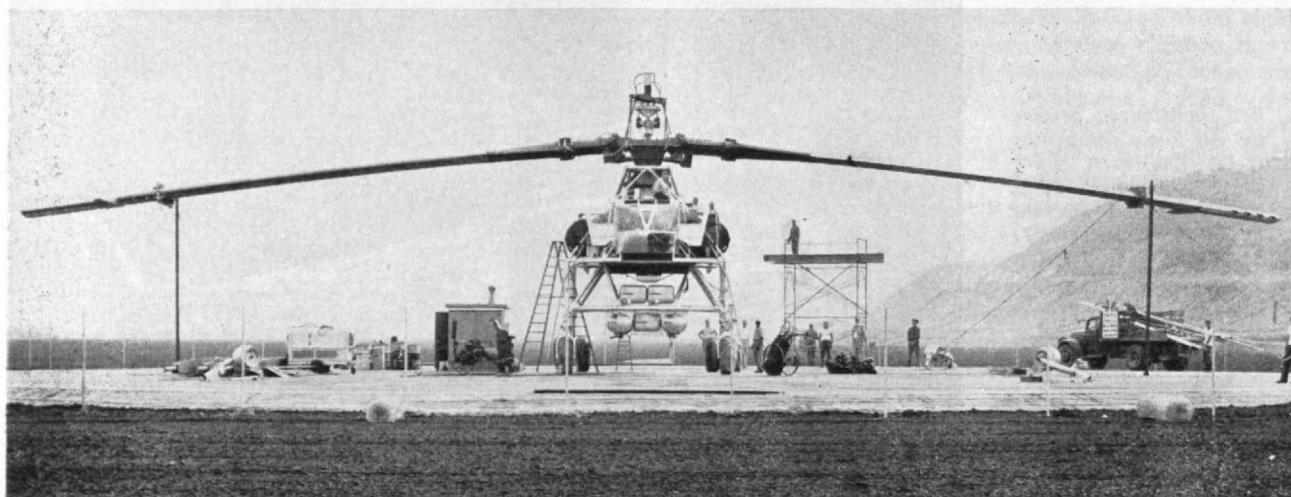
Finally, it does not require a very keen ear to detect, in these early rumblings, the roar of a large and steady procession of helicopter commuters settling down in the centers of our big metropolitan areas each morning. What the automobile and the commuter train began, in making it possible to work in the city

and to live in the country, the transport helicopter will shortly extend and magnify. The time required to commute from the suburban village green to the downtown office building will be sharply reduced and, by the same token, the area within which commuting becomes possible will be greatly extended. An hour's commuting time is not considered excessive by the hardened veteran, and yet an hour in a nonstop commuter helicopter — in machines now in production — would bring him into the center of the city from 100 miles away. In the *New York Case*, the Port of New York Authority recognized its responsibility and undertook to assist in the provision of suitable heliports, including the construction of one on the roof of its new bus station on Eighth Avenue in New York, when the demand exists.⁸⁴

The smoothness of the ride and the reliability of service in all weather, both of which will be essential before this picture can completely materialize, have both been signally forwarded by two developments of the past year. Los Angeles Airways has been authorized by the Civil Aeronautics Authority to operate its mail-carrying helicopters on instruments when the weather is too bad for contact flying, and the successful control of helicopter flight by automatic pilot was worked out by Sperry Gyroscope Company and the Navy Department.⁸⁵⁻⁸⁹ These two developments, which to a certain extent complement each other, are significant advances toward large-scale scheduled helicopter operations.

The effect of the metropolitan helicopter service in assisting the air lines to penetrate the relatively short-haul market, by minimizing the terminal time delays at either end of the trip, has already been mentioned. In Detroit, when access to the air lines was made more difficult by moving the terminal from the Municipal Airport in the heart of the city to Willow Run, 32 miles away, air traffic to Cleveland dropped from 17,000 per month to around 7,000, and to Grand Rapids from over 1,400 per month to around 400.⁹⁰ Conversely, when the time required for a passenger to travel between mid-city and the airport is reduced through short helicopter rides, it is expected that short-haul air traffic will be greatly increased. But this, after all,

(Continued on page 206)



The Hughes XH-17 helicopter uses jet engines to power its single rotor. This experimental unit has an estimated load of 10 tons.

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Life Members Emeriti

LAST month the election of six men to life membership in the Corporation was reported in The Review. These men will fill six of the vacancies resulting from the transfer of seven life members to the newly created status of life member, emeritus.

In creating an emeritus status for life members, the Corporation has taken a step of considerable significance. Under the new procedure, adopted by the Corporation at its meeting on December 3, emeritus membership became available immediately to life members past the age of 70. However, transfer to this status is entirely optional for all those whose election to life membership preceded the adoption of the new policy, and each request for transfer of the status is subject to approval by the Executive Committee. For all life members elected after this date, transfer to emeritus status will be optional at age 70, but compulsory at age 75, except that the Executive Committee shall have the right to ask extension of active service on a year-by-year basis when some unusual situation makes this desirable.

Life members emeriti will be considered as continuing members, receiving all notices and reports, and will be welcome at all Corporation meetings. They will be free to participate in all discussions but without vote, and will be relieved of all committee assignments, except that, on their request, they will be invited to attend such Visiting Committee meetings as are of special interest to them.

The new policy on membership is an outgrowth of suggestions from several of the older Corporation members that the problem of age distribution in the Corporation be discussed and analyzed. Later discussion revolved around the question of whether the effectiveness of the Corporation could be improved by some device which would permit a greater flow of new blood into the Corporation membership, especially from the group of former term members who have been particularly interested and helpful. In order to meet the technical requirements of the Corporation charter and still add younger men, who would be able to take on the obligations of regular attendance and committee service, it was necessary to create a new type of membership for older men which would not entail the obligations of committee membership nor the right to vote, but which would allow these men to continue to give the Corporation the benefit of their advice and counsel.

The seven life members who have elected to assume emeritus status are: W. Cameron Forbes of Boston; Pierre S. du Pont, '90, of Wilmington, Del.; Franklin W. Hobbs, '89, of Boston; Gerard Swope, '95, of New York, N.Y.; Victor M. Cutter of Boston; Lammot du Pont, '01, of Wilmington, Del.; and William C. Potter, '97, of New York, N.Y.

Mr. Forbes graduated from Harvard in 1892 and was elected to life membership in the Institute's Corporation in 1913. In succeeding years, he has served as chairman of Visiting Committees for the Department of English and History, the Medical Department, and the Division of Industrial Cooperation; and, in addition, has served as a member of Visiting Committees in Electrical Engineering, Modern Languages, Architecture, Mechanical Engineering, Aeronautical Engineering, and Meteorology.

Mr. Cutter was elected to life membership in the Corporation in 1929. He served as chairman of the Committee on Museum from 1941-1948 and has also served as a member of the Committee on Finance and Auditing. He was chairman of the Visiting Committee on the Department of Economics and Social Science from 1938-1941 and chairman of the Visiting Committee on the Department of Mathematics for the year 1950-1951. Other Visiting Committees on which he has served are: Business and Engineering Administration, Biology and Public Health, Division of Industrial Cooperation, Modern Languages, and Naval Architecture and Marine Engineering.

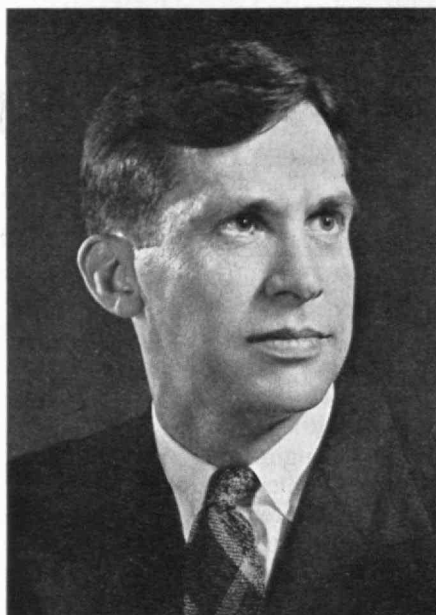
Lammot du Pont served as a term member of the Corporation from 1928-1933 and was elected to life membership in 1934. Since that time, he has served as a member of the Committee on Membership and of departmental Visiting Committees in Chemistry, Chemical Engineering, Civil Engineering, Hygiene, Biology, and the Division of Industrial Cooperation.

Mr. Potter was elected to life membership in the Corporation in 1936 and later served as a member of the Committee on Finance and the Committee on Membership. He was chairman of the Visiting Committee on the Department of Business and Engineering Administration from 1948-1950 and chairman of the Visiting Committee on the Department of Metallurgy in the year 1950-1951. He has also served on Visiting Committees for Biology and Geology.

Pierre S. du Pont was elected to life membership in the Corporation in 1916 and since then has served on departmental Visiting Committees in Physics and English.

Mr. Hobbs was elected to life membership in the Corporation in 1923 and later served as a member of the Auditing Committee and the Committee on Museum. He was chairman of the departmental Visiting Committee for Textiles in 1937-1938 and served also as a member of Visiting Committees in Economics and Social Science, Chemistry, and Mechanical Engineering.

Mr. Swope was elected to life membership in the Corporation in 1923 and served as a member of the Executive Committee from 1930-1946. He was also a member of the Committee on Library and of the Committee on Membership, serving as chairman of the latter from 1937-1948.

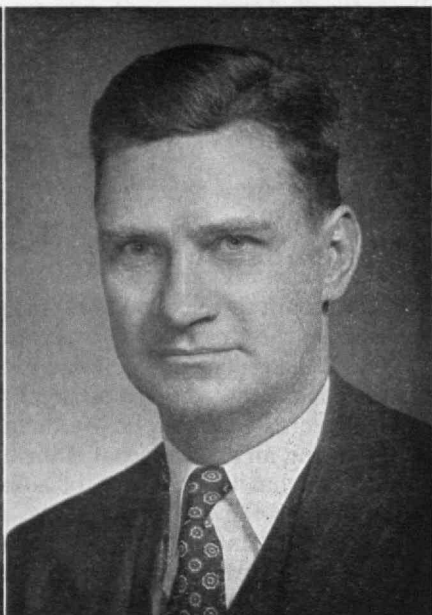


M.I.T. Photos

Carl F. Floe, '35
Assistant Provost



Julius A. Stratton, '23
Vice-president and Provost



Joseph J. Snyder, 2-44
Vice-president and Treasurer

New Administrative Officers

IN keeping with the Institute's postwar growth and widened responsibilities, three new administrative appointments have been announced by President Killian. Julius A. Stratton, '23, and Joseph J. Snyder, 2-44, have been appointed vice-presidents, and Carl F. Floe, '35, has been appointed assistant provost.

As vice-president and provost, Dr. Stratton will be primarily concerned with the Institute's educational and research program and will assist Dr. Killian in discharging the responsibilities of the President's Office. He will share with the deans the administration of educational policy as formulated by the Faculty and will devote himself primarily to the Institute's educational program. Dr. Stratton joins Mr. Snyder as a member of the Corporation of M.I.T.

As vice-president and treasurer, Mr. Snyder will have executive responsibility for the fiscal and business management of the Institute.

In assuming the post of assistant provost, Dr. Floe will be primarily concerned with problems relating to Institute programs of sponsored research and will work closely with the director of the Division of Industrial Cooperation. In addition, the assistant provost will serve as chairman of the Patent and Patent Management Committees and will aid in executing the duties of the Provost's Office.

After having served M.I.T. with distinction since 1924, in a variety of teaching and administrative positions, and after an outstanding war record which won him the Medal for Merit, Dr. Stratton was appointed provost in April, 1949. His biography appears on page 516 of the June, 1949, issue of *The Review* which takes notice that Dr. Stratton is the first academic officer to serve the Institute in the post of provost. Since mid-1949 he has been concerned with the administration of educational activities which do not fall within the jurisdiction of any single school, and with the coordination, in concert with the deans, of inter-school educational and research activities.

Mr. Snyder has been treasurer of the Institute since July 1, 1950, as recorded on page 378 of the May, 1950, issue of *The Review*. He is widely known for his active participation in the financial and business interests of the Institute, as well as in investment management, financial administration, and industrial management affairs in Boston.

Mr. Snyder is a partner in the Colonial Management Associates of Boston, investment advisers to the Finance Committee of the Massachusetts General Hospital and other organizations. He is also vice-president of the investment trusts, the Railway and Light Securities Company and the Gas Industries Fund. He is a trustee and member of the Board of Investment of the Boston Five Cent Savings Bank, a director of the Michigan Seamless Tube Company, and a director of the Transcontinental Gas Pipe Line Corporation.

Born at Dawson, in the Klondike Region of the Yukon Territory, Canada, Dr. Floe received the degrees of bachelor of science and master of science at Washington State College in 1930 and 1932, respectively. M.I.T. awarded him the degree of doctor of science in Metallurgy in 1935.

From 1930-34 Dr. Floe was an instructor in metallurgy at Washington State College, and an assistant professor from 1935-36. He held the same post at the University of Notre Dame from 1936-39, and at the Institute from 1939-42. In 1942 he was appointed associate professor and in 1950 full professor of Metallurgy at M.I.T. He was named executive officer of the Department of Metallurgy in 1943.

During World War II, Dr. Floe served as a consultant for the United States Army Quartermaster Corps and for several companies including the Gorham Manufacturing Company, Pratt and Whitney Aircraft Corporation, Nitralloy Corporation and Vermont Marble Company. At present, he is a director of the White Pigment Corporation, Boston Electro Steel Casting, Inc., and Nitralloy Corporation.

(Continued on page 198)

BUSINESS IN MOTION

To our Colleagues in American Business ...

American business lays great emphasis upon salesmanship, and correctly so, because orders keep a company busy, provide employment, meet the payroll, pay for materials, amortize machines and buy new ones, and, if management is skilled, provide profits. Yet there are times when it is best to turn down an order. If, for example, a would-be buyer really doesn't need what he asks for, it is good business to tell him so, and show him a better way to satisfy his need. Revere has done this many times. In a recent instance, we were able to save a prospective customer some \$30,000. This was done while working with a public utility, an important user of condenser tubes. Examination of leaking tubes from one of its condensers showed that the trouble was due to a combination of erosion and corrosion at the inlet ends; the tubes were in good condition otherwise.

The condenser contains some 4,100 tubes, and to replace them would cost about \$35,000, surely a high price to pay for damage to a few inches at one end of each tube. Revere, instead of taking the order for 4,100 tubes, recommended use of a device to cure the trouble. There are several different makes of such devices, intended to be inserted in the leaky ends, thus effecting a repair. When conditions are suitable, several more years of service may be obtained from the original tubes. In the case under consideration, the cost of the repair was only \$5,000.

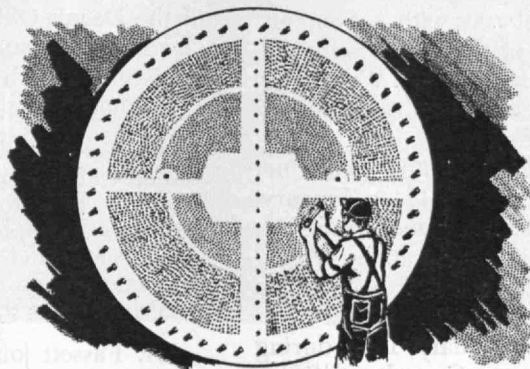
So successful has this recommendation proved for the utility that it has been followed for a sec-

ond condenser. This has about 2,700 tubes, and a corresponding saving has been realized. Of course, one might say that if the condensers had been properly designed in the first place, erosion-corrosion at the inlet ends would not have occurred. This is true, but the fact is that many utilities and other companies operating steam condensers have found it necessary to put burdens on them in excess of those for which they were originally designed. This necessitates increasing the velocity of cooling water, which in turn makes erosion more likely. Also, water conditions often change over a period of years, so that more corrosive conditions may build up, particularly in the industrial areas where so many condensers are located.

In showing this customer how to avoid buying a lot of condenser tubes, Revere was motivated by two principles. One was, and is, that fast friends and loyal customers are won by taking to heart the best interests of those

with whom we deal. The other is the patriotic motive of making the vital copper alloys serve as long and go as far as possible.

Many other materials besides Revere's Copper and Copper Alloys and Aluminum Alloys are vital to defense in one way or another. We urge everyone to conserve such materials as much as possible. Consult your suppliers. Like Revere they are not in business just for today or tomorrow, but, we all hope, forever. They will know what can be done to lengthen the service to be expected. This is not only patriotic, but it is also good business for them and for you.



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Frank Heads Physics Department

THE appointment of Nathaniel H. Frank, '23, as head of the Department of Physics at the Institute was announced by Professor George R. Harrison, Dean of Science at M.I.T. Professor Frank was appointed acting head of the Department of Physics last spring, as recorded on page 491 of the July, 1951, issue of *The Review*.

Professor Frank succeeds Professor John C. Slater, who had been head of his Department for more than 20 years. Dr. Slater was recently appointed to the newly created and distinguished post of Institute Professor at M.I.T. and is now on a year's leave of absence to carry on research at Brookhaven National Laboratory on Long Island.

Born in Boston, Dr. Frank received the degree of bachelor of science from M.I.T. in 1923, and the degree of doctor of science in 1927, and has been associated with the Institute ever since. He served the Department of Physics as executive officer from 1949 to July, 1951, under Dr. Slater.

Dr. Frank spent 1929-1930 in Munich, Germany, doing research in theoretical physics with A. Sommerfeld, and in 1935 was a guest of the Institute for Advanced Study at Princeton. During World War II, Dr. Frank contributed important service to research and to development in the war effort.

His war activities may be divided into two distinct phases: first, a period from May, 1941, to January, 1943, during which he was a staff member of the Radiation Laboratory at M.I.T. His work at the laboratory comprised theoretical researches of phenomena associated with the propagation of microwaves.

The second period was after January, 1943, during which he held the post of Expert Consultant, Office of the Secretary of War, with headquarters in Wash-

ington. In this post he was engaged primarily in the formulation and monitoring of technical programs designed to meet wartime requirements, especially in the field of radar.

Dr. Frank is well known in the fields of theoretical physics and metallic conduction. He is the author of two introductory texts in physics and co-author, with Professor Slater, of a standard introduction to theoretical physics. A Fellow of the American Academy of Arts and Sciences, he is also a Fellow of the American Physical Society and member of the Association of Physics Teachers.

Fassett Appointed Associate Dean

THE appointment of Frederick G. Fassett, Jr., as Associate Dean of Students at the Institute has been announced by President Killian. Mr. Fassett will continue his work as director of publications and director of the Technology Press, but will be freed from his duties as director of the Institute's Summer Session.

As associate dean of students, Mr. Fassett will work closely with Dean E. Francis Bowditch in all phases of life at the Institute for which the Office of the Dean of Students is responsible. He will be particularly concerned, at least in the initial stages of his work, with the dormitory system, the relationship of the Dean's Office to the fraternities, the problems of commuting students, and co-operation of the administration with undergraduate publications.

In announcing the appointment, Dr. Killian said:

Mr. Fassett has had a long and varied experience both within and without the Institute which makes him admirably fitted to fill this new post and carry out the Institute's policies of developing the whole man, of strengthening and expanding the concept of student life and activities run by and for the students in accordance with the highest standards and traditions of M.I.T.

Mr. Fassett joined the M.I.T. staff in 1930 as an instructor in the Department of English and History, was named assistant professor of English in 1934, and associate professor in 1938. Chairman of the Advisory Council on Undergraduate Publications, Mr. Fassett was appointed, in 1938, editor of *The Technology Review*, of which he had been an editorial associate since 1935.

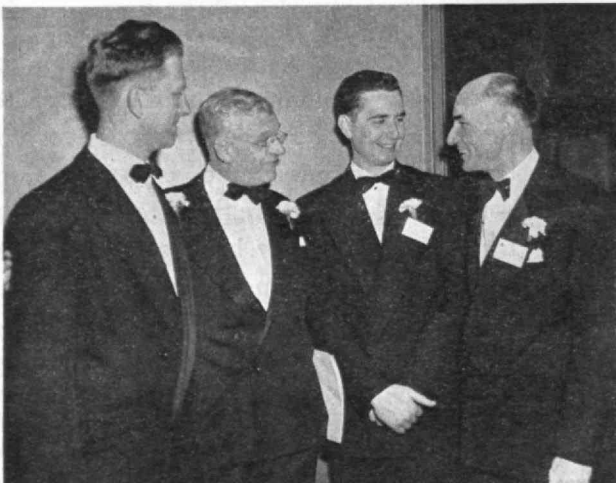
In 1945, Mr. Fassett left M.I.T. to become director of publications and public relations for the Carnegie Institution of Washington, a post which he held until returning to the Institute in 1951.

James R. Jack: 1866-1952

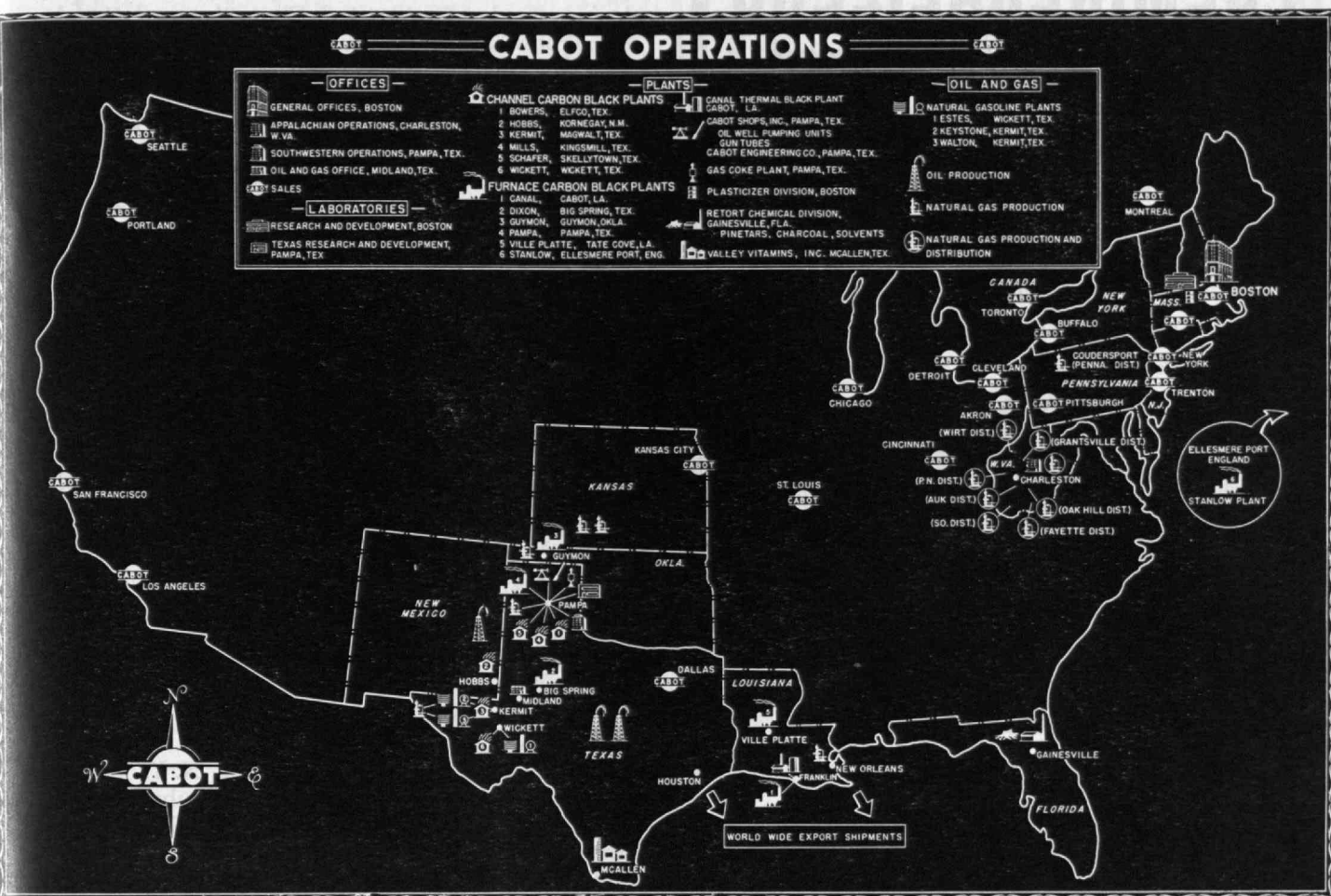
PROFESSOR EMERITUS JAMES R. JACK, Head of the Department of Naval Architecture and Marine Engineering at M.I.T. from 1919 to 1936, and a distinguished designer, shipbuilder, and educator, died at his home in Watertown, Mass., on January 6.

Professor Jack aided in the design of the first turbine ship, launched in Scotland by William Denny and Brothers, Ltd., in 1901. He was responsible for the design of about 350 vessels between 1901 and 1918, including the first ship propelled by a combination of steam reciprocating and turbine machinery,

(Continued on page 200)



A.S.M.E. Secretary, C. E. Davies (with glasses), presents (left to right) to Warren M. Rohsenow, Assistant Professor of Mechanical Engineering, the Gold Medal of Pi Tau Sigma; to John D. Stanitz, '42, doctoral candidate at M.I.T., the A.S.M.E. Junior Award; and to Jacob P. Den Hartog, Professor of Mechanical Engineering, the Worcester Reed Warner Medal.



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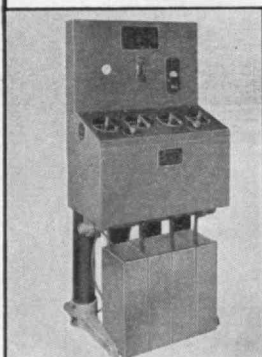


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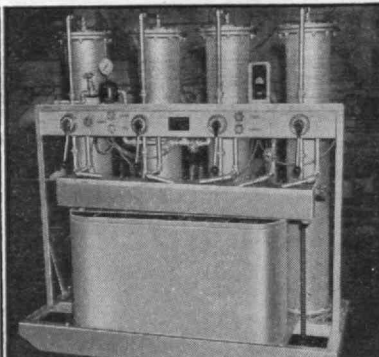
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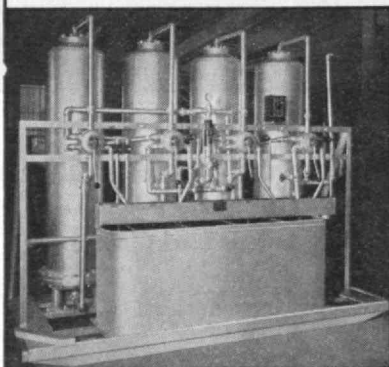
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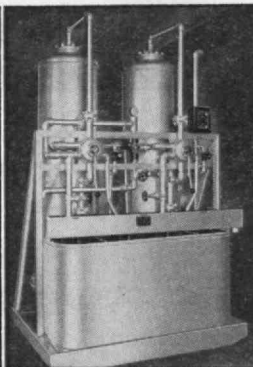
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THE INSTITUTE GAZETTE (Continued from page 198)

and later directed construction for Sir Thomas Lipton's contenders for America's Cups, *Shamrock II* and *III*. Professor Jack was awarded the Order of the British Empire which King George V presented to him at Buckingham Palace in 1918.

In 1919 Professor Jack delivered a series of lectures at M.I.T. and the following year was appointed head of the Institute's Department of Naval Architecture and Marine Engineering. He was largely responsible for the establishment of the Institute's Nautical Museum of which he became director in 1924 and honorary curator upon his retirement in 1936 until 1945.

Educational Council Formed

ARTHUR L. BRYANT, '44, Assistant Director of Admissions at the Institute, has been appointed executive secretary of the M.I.T. Educational Council, and will be responsible for assisting M.I.T. alumni groups throughout the country in organizing an educational council on a nationwide basis.

The M.I.T. Educational Council, which will be built around the existing nuclei of Alumni Clubs and Honorary Secretaries, will consist of selected Alumni appointed by President Killian. Council members will be prepared to be of service to school principals and guidance counselors, as well as to students, by providing information and advice relative to the fields in which M.I.T. offers training.

Mr. Bryant, a native of Binghamton, N. Y., graduated from M.I.T. in October, 1944, and subsequently served two years in the United States Navy as an Ensign. He received a second S.B. degree in Business and Engineering Administration from M.I.T. in 1947 and the degree of master of education from Boston University in 1949.

Space for Physicists

THE Visiting Committee on the Department of Physics* met in the office of Professor John C. Slater, Head of the Department, on March 5, 1951. Present at this meeting were: Dr. Slater, representing the Department; Professor Julius A. Stratton, '23, Provost, and Professor George R. Harrison, Dean of Science; and Messrs. Barker, Chesterman, Desmond, Johnson, and Morse, of the Committee.

The meeting reviewed in considerable detail with Dr. Slater the work and progress of the Department as well as its problems. All were gratified at the competence with which departmental affairs are being handled.

The only matter which the Committee believed should be brought to the attention of the Corporation concerned the physical conditions under which the work of the Department has to be handled due to the lack of adequate space provision. The Committee
(Concluded on page 202)

*Members of this Committee for 1950-1951 were: James M. Barker, '07, chairman, Francis J. Chesterman, '05, Thomas C. Desmond, '09, Richard S. Morse, '33, Ralph P. Johnson, '36, I. I. Rabi, and Alan T. Waterman.

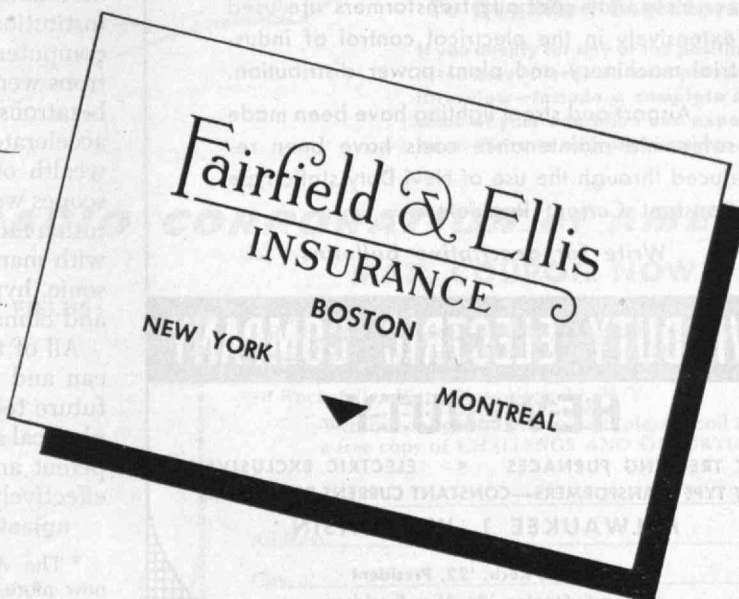


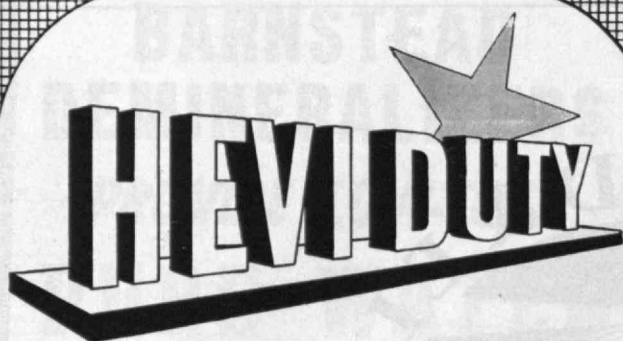
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THE INSTITUTE GAZETTE

(Concluded from page 200)

realized that the Institute's Administration was aware of the problem, but nevertheless felt that it must emphasize its agreement with Dr. Slater that a new building is necessary to permit the efficient continuance of the Department's vitally important work. At the present time, too, many of the departmental activities are being conducted in dispersed and temporary quarters.

The Committee did not wish to make insistent recommendation to the Institute's Administration for the immediate construction of a building for the Physics Department; it did, however, wish to make as its unanimous and major recommendation that adequate and satisfactory quarters be provided for this extremely important Department at the very earliest feasible time. To that end, the Committee recommended that detail planning for such quarters start immediately.

SHORTAGE OF ENGINEERS

(Continued from page 189)

he notes, "each senior member directs the work of two assistants," but there is no basic reason why that ratio should not be raised substantially. Of course, before any such increase in the ratio of investigators-to-directors can be made to yield any net gain, the qualifications of all members of the team will have to be considered carefully and fitted together into a unified working whole.

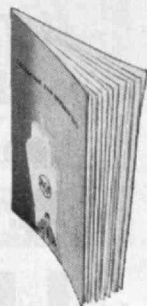
Although not the primary purpose of the report, the listings in "University Research Potential" give an impressive picture of the material, as well as the human resources, which are currently available in our colleges and universities, not alone for research but for the equally basic purpose of teaching. The questionnaire asked the colleges to list "unusual" items of equipment not commonly found in educational institutions of higher learning. While the interpretation of the word "unusual" varied, the replies listed 12 institutions with digital computers, 28 with analog computers, and 19 with differential analyzers. Cyclotrons were mentioned in 20 replies, 4 institutions had betatrons, 6 had synchrotrons, and there were 14 linear accelerators of one type or another,* along with a wealth of other apparatus. Some 52 electron microscopes were listed, and hardly a major technical institution failed to list at least one wind tunnel—a gadget with many variations, for subsonic, transonic, supersonic, hypersonic, low turbulence, high temperature, and climatology tunnels were enumerated.

All of this superb equipment is to the good, and it can and will play an important role in the nation's future technological development. But no amount of physical assets will be of practical value without competent and ample man power to use these facilities effectively. So again we are confronted with the prob-

(Continued on page 204)

* The Atomic Energy Commission states that there are now more than 70 particle accelerators of all forms—cyclotrons, cosmotrons, synchrotrons, Van de Graaff generators, and so on—in operation in this country.

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(Continued from page 202)

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lem of scarcity of technically trained personnel, and may well ask ourselves what can be done to overcome our past shortsighted policies on man-power utilization and how can we best make use of the present and future human resources.

Basically, the solutions to the man-power shortage appear to break down into three categories, dealing with: (1) those already trained or experienced in engineering; (2) those now in, or soon to enter, our engineering schools and from whom tomorrow's crop of engineers will come; and (3) those who, although not material of which engineers are made, can be trained in technical duties of such nature as to free more capable personnel for engineering assignments.

A clear-cut analysis of what must be done about the shortage of technical man power has been supplied by Charles E. Wilson, Defense Mobilization Director. Speaking at the twentieth anniversary meeting of the American Institute of Physics in Chicago in October, Mr. Wilson said:

"First, government, industry, and educational institutions must make the most effective possible utilization of those persons who have received scientific and technical training. Any failure to utilize such personnel in the most effective possible manner plays into the hands of those who want to see our defense mobilization program fail. All departments and agencies of the Federal Government must set the example in this respect.

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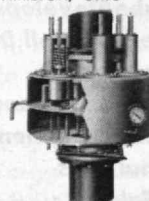
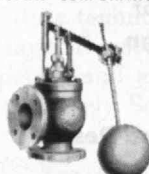
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"Third, industry and government should develop both on the job training programs and co-operative training programs with institutions of higher learning and other educational institutions which will result in employed persons receiving scientific and technical training. Where persons now employed possess the aptitudes for such training, methods must be developed which will result in utilizing what will otherwise remain a hidden source of potential scientific and technical man power. I appeal to our educational institutions and to administrators in Government and industry to take every available measure to help alleviate the shortage of scientific and technical personnel. This must be done if our defense program is to succeed."

† Such a service has been under consideration at M.I.T., and after more than a year of careful study is now in effective operation, as stated on page 200 of this issue of The Technology Review.

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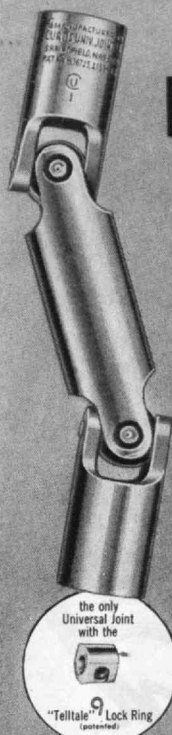
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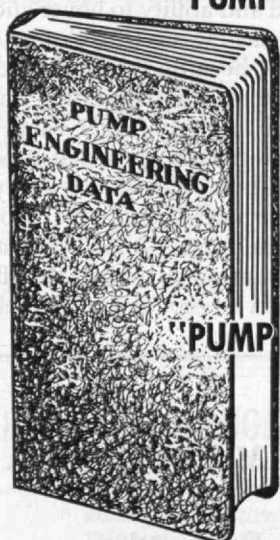
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TRANSPORT HELICOPTERS

(Continued from page 194)

is an interim answer, for it is quite clear that in the long run the short-haul traffic will belong to the helicopters, not the fixed-wing airplanes.

The average length of haul per passenger on the trunk lines is well over 400 miles, and it is the market for trips of less than 180 miles which the air lines have been unable to penetrate to any appreciable extent.⁹¹ Yet, this is the field where the advantages of the helicopter are most evident. In such relatively short hops, from city center to city center, the slower speed of the helicopter is more than compensated for by the fact that it is not necessary to begin and end the air journey at airports far from the center of town.

The local service or "feeder" air lines, as they used to be called, already have their eyes on the new helicopters as being equipment holding real promise in meeting their requirements. Even with today's 10- and 12-place machines, such local service is completely practical, and when the 20-, 30-, and 40-place passenger machines now in the development stage come on the market, such services between the centers of large cities within reasonable range of each other become practically inevitable. In a recent article in the *Aeronautical Engineering Review*,⁹¹ Charles Froesch, then Chief Engineer, now Vice-president, for Eastern Air Lines, demonstrated that, for points up to 180 miles apart, the over-all downtown-to-downtown time for a helicopter is less than that for an air-line traveler and that, while the over-all cost to the air-line passenger is \$0.07 to \$0.095 cents per mile, the direct flight costs on a 25- to 30-passenger helicopter could be as low as \$0.045 cents per seat-mile. Local service by helicopter is clearly coming.

Jet Transport Complements Helicopter

Coincident with the gain in favor by the helicopter, because of its slow speed and ability to hover and land almost anywhere, another new aircraft, the jet transport, is also gaining favor because it is endowed with precisely the opposite attributes. These two new developments are destined to complement each other. As the new jet transports go into service at speeds of 400, 500, or 600 miles an hour, almost inevitably they will require very large airports even farther from the centers of cities than the present ones. Also, almost inevitably, they will be nonstop or limited-stop flights, for only such flights would be economical at such high

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speeds. In bringing the passengers to and from these distant jet airports, the helicopter local service operator will complete the new picture of rapid transportation all the way by air. It is fortunate that two such distinct and radical developments in air transportation, appearing on the horizon at the same time, should complement each other so well.

Policy of Federal Government toward Commercial Development of Transport Helicopters

The Federal Government has taken steps to encourage the development of the transport helicopter in civilian uses. It has formulated a commendable policy calculated to support and encourage the development of the transport helicopter (seven passengers and larger).

To the Post Office Department goes the credit for sparking the study to determine this policy. Late in 1950 the Department requested the Air Coordinating Committee† to undertake such a study. It has been completed. As a result of the study, the Air Coordinating Committee has issued a report (59 pages, including appendixes), dated July 19, 1951, unanimously agreed to by the members of the Committee, entitled "Federal Policy Regarding the Development of Commercial Transport Helicopters." It is an excellent and statesmanlike report.‡

In addition to its extensive analytical sections, the report contains conclusions and recommendations. Conclusion Number 10 states in general terms the strong backing of the Air Coordinating Committee as follows:

(Continued on page 208)

† The Air Coordinating Committee is composed of the Under Secretary of State, the Under Secretary of the Air Force, the Under Secretary of the Navy, the Under Secretary of the Treasury, the Assistant Postmaster General, the Assistant Secretary of Commerce, the Chairman of the Civil Aeronautics Board, and the Assistant Director in Charge of the Fiscal Division of the Bureau of the Budget (nonvoting).

‡ The report is frequently referred to as the "Waldo Report" because of the fact that the chairman of the Helicopter Working Group, established by the Economic Division of the Air Coordinating Committee, undertaking the study was Richard K. Waldo, who was loaned for the purpose by the Civil Aeronautics Administration of the Department of Commerce. Other members of the Helicopter Working Group were: Burdell L. Springer of the Department of Commerce; Captain Francis D. Foley and Commander M. C. Peters of the Department of the Navy; and Colonel Richard W. Bonnaville and H. Heinrich Spang of the Department of the Air Force.

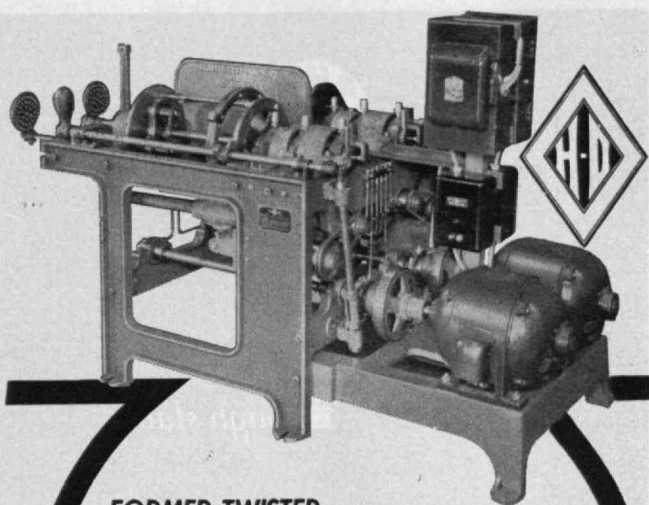
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TRANSPORT HELICOPTERS

(Continued from page 207)

The present and potential value of the helicopter to the commerce of the United States, the postal service, and the national and civil defense clearly justifies the continuation and acceleration of the government's policy of support and encouragement of helicopter development and utilization.

The recommendations are specific to the Post Office Department, the Civil Aeronautics Board, the Civil Aeronautics Administration, the Department of Defense, and the National Advisory Committee for Aeronautics. Taken collectively these recommendations spell out a strong and aggressive policy of Federal Government support for the development of civilian-used transport helicopters. Probably in no other field of civilian commercial activity has there been a more timely and constructive policy developed for future use at exactly the moment when it was most needed.

Cost Considerations

None of these dreams will come true, however, unless the cost of buying and operating the big, new helicopters is such that the price of transportation is one which the passenger or shipper can afford to pay. This naturally breaks down into capital cost and operating cost.

No transport helicopters have yet been delivered on the commercial market or to other than the military services. Consequently, the market price of these machines has not yet been established. Based on the cost of production of the military models, however, it is possible to estimate the range of probable commercial sales prices. Based on its knowledge of the subject, the Helicopter Council of the Aircraft Industries Association, made up of the leading helicopter manufacturers, has estimated some time ago that the price of a 10-place helicopter will be somewhere between \$120,000 and \$150,000.⁹² Assuming the higher of these two figures, the cost per seat would be less than that for the Constellation or Stratocruiser and equal to that for the DC-6.⁹³ It is thus apparent that, considering the cost of the aircraft alone, the helicopter will be competitive in price with the fixed-wing aircraft.

(Continued on page 210)

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(Continued from page 208)

Two other factors must also be considered in this connection however. The first is that the helicopter requires only a very small landing area, with relatively inexpensive improvements, as a heliport. §

Secondly, the fact that the helicopter does not require the fabricating of large, thin sections necessitating much handwork and extensive plant area, as does the fixed-wing plane, and the fact that such specialized helicopter components as the transmission and rotor head are susceptible of machine manufacturing methods, render the helicopter much better adapted to quantity or mass production than the fixed-wing airplane.⁹³ Since the estimated prices quoted above are for machines at a relatively low rate of production, the effect on original cost of putting them into quantity production will be such as to make the cost picture more favorable.

Direct costs of operation in commercial service must also be estimates for these larger machines, of course, since no one has operated them commercially. Some authoritative estimates, which at least indicate the trend, have been made, however. In the *Los Angeles Renewal Case*, referred to above, the Piasecki Company estimated that a machine of its HRP type, fitted with high-density seating for 21 passengers, could be operated over the routes proposed in the *New York Case* for \$0.032 per seat-mile. This is comparable to a DC-3 and was based on an assumed first cost for the machine itself of \$180,000 and a weight of 170 pounds per passenger.⁹⁴ As was pointed out above, a seat-mile direct operating cost of \$0.045 for a machine carrying 25 to 30 passengers is estimated. When the 25-30 passenger machines now under development come on the market, the cost per seat-mile will go down even further.

These cost estimates and forecasts were carefully studied by the Air Coordinating Committee in the Waldo Report referred to above. The Waldo Report points out that the Department of Defense today has production contracts for four types of transport heli-

(Continued on page 212)

§ In fact, in the *New York Case* one of the applicants proposed that heliports in suburban communities be combined in some cases with centrally located gasoline service stations, thereby providing mutual benefits for the community, the helicopter operator, and the gas station operator.



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TRANSPORT HELICOPTERS

(Continued from page 210)

copters (and development contracts for five more) with five different manufacturers which, as commercial models, would range in capacity from seven to 44 passengers plus mail and cargo, with one model capable of carrying 70 passengers. Under certain assumed operating conditions, the Waldo Report estimates a direct operating cost per ton-mile of transport helicopters to be from about \$1.00 to as low as \$0.33 to \$0.35. The costs decrease with increasing size and work capacity, with the cost curve flattening out, at the present state of the art, at the 20- to 30-passenger size. With subsequent experimentation, operating costs may slide in the direction of the \$0.22 per ton-mile cost for the DC-3 aircraft.^{95, 96} Such a cost picture means that the helicopter will ultimately be capable of making substantial inroads into the mass short-haul travel market represented by passenger trips of less than 200 miles, and that it will create new short-haul business in this area. Furthermore, such helicopter travel would tend to be more competitive than the airplane, economics-wise, with the automobile, train, and bus transportation.

The twin industries of helicopter manufacture and helicopter operation (scheduled, nonscheduled, fixed-based, contract, or what-you-will,) which bid fair to effect something of a revolution in transportation, and to become an accepted instrument in agriculture, industry, and commerce, look like good places for a young man.

The author wishes to acknowledge with thanks the valuable services of Brackley Shaw, and of James F. Bell in the preparation of this article.

REFERENCES

⁹⁵ An interesting discussion of the development of the helicopter industry, manufacturing and operational, is to be found in "Up with the Helicopter," *Fortune*, XLIII: 91, No. 5 (May, 1951).

⁹² Piasecki, F. N., "Military Aspects of the Transport Helicopter," presented before the joint meeting of the Ottawa Aeronautical Society, the Institute of the Aeronautical Sciences, and the Engineering Institute of Canada, October 30, 1950.

⁶¹ "A Survey of Progress in the Development of Helicopters and Their Uses," prepared by the Helicopter

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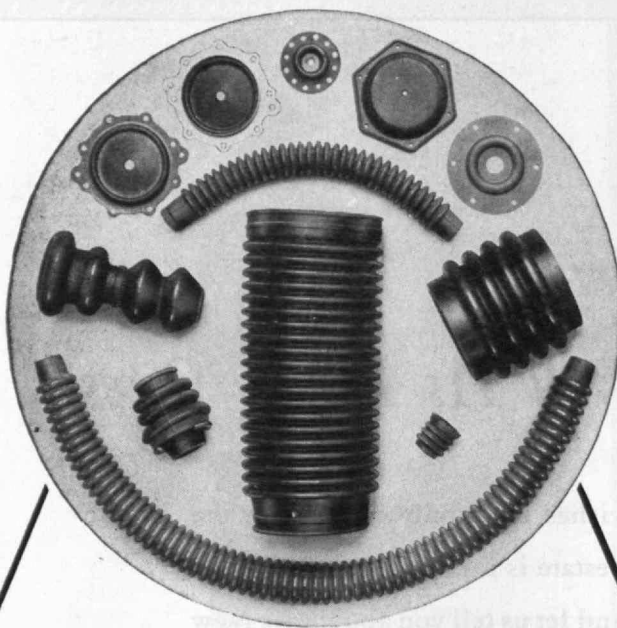
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Council of the Aircraft Industries Association of America, Inc., and submitted as Exhibit PC-1 in the *New York City Area Helicopter Service Case*, C.A.B. Docket No. 946, *et al.*

⁶² "Leading Helicopters of the U.S.," *Aviation Week*, page 84, February 26, 1951.

⁶³ "Development of the McDonnell XHJD-1," *American Helicopter*, July, 1950.

⁶⁴ "Statement of F. N. Piasecki," Exhibit PC-2, *Los Angeles Certificate Renewal Case*, C.A.B. Docket No. 3800.

⁶⁵ *American Helicopter*, VII: 4, No. 8 (July, 1947).

⁶⁶ "Statement Before the Civil Aeronautics Board in the New York City Helicopter Service Case by Bell Aircraft Corporation Concerning Bell Feeder-Liner Helicopters," February 6, 1950.

⁶⁷ "Testimony of Sikorsky Aircraft Division of United Aircraft Corporation," Exhibit PC-4 in the *New York City Area Helicopter Service Case*, C.A.B. Docket No. 946, *et al.*, February 6, 1950.

⁶⁸ "Helicopter Value Recognized by Military," *Aviation Week*, February 26, 1951.

⁶⁹ Berry, M., "Bell Anti-Submarine XHSL-1," *American Helicopter*, XXI: 10, No. 3 (February, 1951).

⁷⁰ For a discussion of the development and future of the large transport helicopter in Great Britain, see the Report of the Interdepartmental Helicopter Committee, appointed by the Minister of Civil Aviation, digested in *Aviation Week*, 54:21, No. 15 (April 9, 1951); Desoutter, Denis, "New British Helicopters," *Aviation Age*, 15:23, No. 5 (May, 1951); reference No. 61 contains some discussion of the French position in this field, too.

⁷¹ An article in *Aviation Age* states that "Russia appears to be far behind both the U.S. and England on the matter of rotating wing aircraft . . ." However, the article also states that Ivan P. Bratukhin "reportedly is in production now with a 16-24 place machine." "Russia's Designers," *Aviation Age*, page 25 (July, 1951).

⁷² Testimony of F. N. Piasecki, I. Sikorsky, and E. E. Gustafson (Bell Aircraft) in the *Los Angeles Certificate Renewal Case*, C.A.B. Docket No. 3800, Tr. 23-26, 44-46, and 58-59.

⁷³ See exhibits of leading helicopter manufacturers submitted in the *New York City Area Helicopter Service Case*, C.A.B. Docket No. 946, *et al.*, as PC-4, page 2; PC-5, page 12; PC-6, page 2.

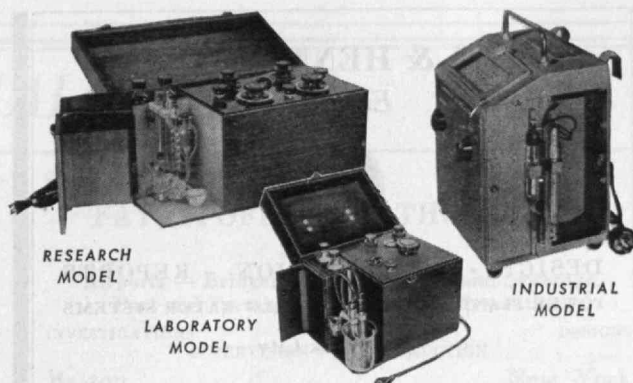
⁷⁴ Gill Robb Wilson in the *New York Herald Tribune*, December 12, 1950.

⁷⁵ Exhibit PC-1, *Los Angeles Renewal Case*, C.A.B. Docket No. 3800.

⁷⁶ *Times Herald*, XIII:1, No. 232 (September 20, 1951).

⁷⁷ *Marine Corps Schools*, published at Quantico, Va., 1951.

(Concluded on page 214)



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TRANSPORT HELICOPTERS

(Concluded from page 213)

⁷⁸ Letter dated February 2, 1950, from Colonel K. M. Landon, Deputy Chief of Staff, Armed Forces Special Weapons Project, to Admiral D. C. Ramsey, President, Aircraft Industries Association, submitted in *New York City Area Helicopter Service Case*, C.A.B. Docket No. 946, *et al.*, Tr. 34, 35.

⁷⁹ Letter dated February 16, 1950, from Major General Robert M. Webster to Fred M. Glass, Director of Airport Development, Port of New York Authority, submitted in *New York City Area Helicopter Service Case*, C.A.B. Docket No. 946, *et al.*, by the Port of New York Authority as Exhibit No. 27.

⁸⁰ For a discussion of the effect the large military orders have had on the helicopter industry, see "Helicopters Again — Rescue Jobs in Korea Boom Military Demand for 'Flying Windmills,'" *Wall Street Journal*, January 5, 1951.

⁸¹ *The New York City Area Helicopter Service Case*, C.A.B. Docket No. 946, *et al.*

⁸² *Los Angeles Certificate Renewal Case*, C.A.B. Docket No. 3800, decided July 5, 1951.

⁸³ "Report of Examiner," page 11, *Los Angeles Airways Certificate Renewal Case*, Docket No. 3800, served March 23, 1951.

⁸⁴ "Statement of Fred M. Glass," Director of Airport Development, Port of New York Authority, in the *New York Case*, C.A.B. Docket No. 946, *et al.*

⁸⁵ Coleman, Frank, "Automatic Pilots for Helicopters," *American Helicopter*, XXI:11, No. 3 (February, 1951).

⁸⁶ Exhibit PC-1, *Los Angeles Renewal Case*, page 3, C.A.B. Docket No. 3800.

⁸⁷ *Wall Street Journal*, January 30, 1951.

⁸⁸ *Aviation Week*, page 17, November 20, 1950.

⁸⁹ For a discussion of the development of autopilot and the engineering principles involved, see Meyers, D. N. and Vanderlip, E. G., "Helicopter Stability via Automatic Control," *Aero Digest*, 62:17, No. 6 (June, 1951).

⁹⁰ Transcript of Hearing in the *New York Case*, pages 741-743, C.A.B. Docket No. 946, *et al.*

⁹¹ Froesch, Charles, "Looking Ahead with Air Transport," *Aeronautical Engineering Review*, May, 1950.

⁹² "A Survey of Progress in the Development of Helicopters and Their Uses," page 13. See reference No. 61.

⁹³ "A Survey of Progress in the Development of Helicopters and Their Uses," page 43. See reference No. 61.

⁹⁴ "Statement of F. N. Piasecki," page 14. See reference No. 64.

⁹⁵ "Federal Policy Regarding the Development of Commercial Transport Helicopters," Air Coordinating Committee (July 19, 1951), pages 16-21.

⁹⁶ Waldo, "Economic Prospects for Large Transport Helicopters," *Proceedings of the Seventh Annual Forum of the American Helicopter Society in Cooperation with the Institute of Aeronautical Sciences*, April 27, 1951 (New York: Institute of the Aeronautical Sciences), \$5.50.

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FILM THICKNESS COMPARATOR: A new optical device for measuring the thickness of film consists of a film of barium stearate deposited in a series of successive monomolecular layers upon a plate of special glass. Each layer has a thickness of 0.1 microinch, and the successive layers are deposited in such a way as to build a series of steps that differ in thickness by 1 microinch. When the step gage is illuminated by white light, each step reflects a color, which is determined by its thickness. The steps are thus seen as a series of colored stripes on the glass plate. The colors are produced by the interference of light reflected from the front and back surfaces of the film. Since the colors are produced by interference rather than by selective absorption, they are not subject to fading.

The step gage serves as a standard for comparison with other films that reflect interference colors—such as those produced by evaporation, sputtering, and plating. The measurement is simple and direct; the color of the unknown is matched with that of one of the steps and the thickness read directly from the scale. A correction must be made for the refractive index of the material.

General Electric Review
November, 1951



M. C. LEVERETT

Aircraft Nuclear Propulsion Project

AIRCRAFT NUCLEAR PROPULSION: One pound of uranium-235 will liberate heat, on undergoing fission, equivalent to the energy liberated by burning 1,700,000 pounds of gasoline. It is at once evident, if a means can be found for converting the energy of nuclear fission into thrust, that aircraft can fly for very long times on very small amounts of fuel. Indeed, fuel consumption would be measured not in thousands of pounds per hour, but in pounds per day.

In many respects the propulsion of aircraft is an ideal use for nuclear energy. Here, to a higher extent than in any other application, the advantages of a highly concentrated source of heat can be used to good result. Although the goal of producing a nuclear powered aircraft is an admittedly ambitious one, it is only such high-performance, premium uses of energy which can today justify the consumption of as rare a resource as uranium-235 or plutonium-239. Moreover, it is inescapable that a development of this type has great military significance.

In recent months the government has announced that the nuclear aircraft program is entering a new phase. In this new phase, the Aircraft Gas Turbine Department of the General Electric Company has been given the responsibility for the propulsion system, and the Consolidated Vultee Aircraft Corporation is to supply an airframe.

My belief is that our efforts to fly an aircraft on nuclear power will be successful. The difficulty of the task and the value of the result combine to form a challenge which is, in my opinion, unmatched.

*Chicago Section,
Institute of the Aeronautical Sciences*
October 4, 1951



J. G. HUTTON

T. E. USHER

General Engineering Laboratory

RECENT DEVELOPMENTS IN MASS SPECTROMETRY: In the fields of chemical analysis and process control, recent years have seen many attempts to provide new and improved methods for accurately determining the qualitative and quantitative composition of gaseous

and/or liquid mixtures. Numerous physical methods employing the use of refractive indices, densities, and various excitational and optical phenomena have been devised. Infrared and ultraviolet absorption and the Raman effect have been found useful in the examination of many of the simpler mixtures, and have been proved very satisfactory in this work.

All of these methods suffer from rather severe limitations, either because of their very nature or because of restrictive practical considerations.

By contrast, in the present state of the art, the mass spectrometer can be generally extended to all mixtures whose components are fully vaporized at a pressure of 20 to 40 microns at normal temperature.

The clarity of the spectral data available from the mass spectrometer is at once evident upon comparison with the spectrum obtained from the optical methods previously mentioned. Here one is measuring by electronic means a fundamental unit—that is, mass. One rather serious drawback, however, which until recently has seemed to place a limit on the scope of applications for the mass spectrometer, is the high initial cost of the instrument in its conventional commercial form.

The recent advent of what may be referred to as high-frequency mass spectrometers may largely alter the outlook for mass spectrometer application. By offering the possibility of meeting the demand for a relatively low-cost instrument of limited mass range without losing any of the fundamental advantages of the general mass-spectrometric method, these new instruments may soon play an important role in industrial processes.

General Electric Review
November 1951

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Alumni AND Officers IN THE News

Men of Ability

At the Centennial Convocation of Northwestern University, held on December 2, four M.I.T. Alumni were among those honored for "distinguished service to society" while residing in those states now corresponding to the old Northwest Territory. The Northwestern University Centennial Awards were granted to the following men of Technology: ALFRED P. SLOAN, JR., '95, chairman of the board of General Motors Corporation; ANDREY A. POTTER '03, dean of engineering at Purdue University; EDWARD L. RYERSON '09, chairman of the board of directors of Inland Steel Company; and ROBERT E. WILSON '16, chairman of the board of Standard Oil Company of Indiana.

DR. JAMES H. MEANS '06, staff physician at M.I.T. and world-renowned authority on diseases and functions of the thyroid gland, won a \$500 award for two articles appearing in the 1950 volume of the *Atlantic Monthly*, written in defense of Britain's nationalized medical setup and against the American Medical Association's position on government health insurance. The award was given by the Sidney Hillman Foundation in New York, in recognition of outstanding journalism and literary endeavor.

HAROLD F. SHAW '11, former director and designer for the F. A. Whitney Carriage Company of Leominster, Mass., has been elected president of the Arlington Chair Company.

LAWRENCE B. RICHARDSON '21 has been elected director and senior vice-president of the Electric Boat Company of Groton, Conn. Mr. Richardson will also serve as a director of Electric Boat's Canadian aircraft manufacturing subsidiary, Canadair, Ltd., of Montreal, largest aircraft manufacturer in Canada.

A movie film of Venice, taken by OSCAR H. HOROVITZ '22 during a trip to Europe last spring, has been selected by *Movie Makers* magazine of the Amateur Cinema League as one of the 10 best amateur films of 1951. Since 1943, Mr. Horovitz has placed in the "10 best" category three times and has won three honorable mentions. A citation from the Amateur Cinema League, which is a world-wide organization of movie makers, is equivalent to a Hollywood Oscar in amateur circles. Mr. Horovitz' movie of Ringling Brothers and Barnum & Bailey Circus, which was selected last year as one of the 10 best amateur movies by the league, also received recognition from the *American Cinematographer* and was described as one of the best film documents of a circus ever seen by *American Cinematographer* reviewers.

FREDERICK O. A. ALMQUIST '23 and WILLIAM B. DUFFY '27 were recently elected president and vice-president, re-

spectively, of the New England Water Works Association.

Three Technology men were awarded citations at the recent 60th anniversary celebration of the Drexel Institute: MILES N. CLAIR '23, for civic leadership, for studies at the Logan International Airport, Boston, and for advancing the technology of concrete construction; ALFRED T. WAIDELICH '30, for leadership in civil engineering; and A. H. WAGNER '31, for professional leadership in civil engineering.

PAUL V. KEYSER, JR., '29, has been appointed general manager of Socony-Vacuum Oil Company's domestic marketing.

Five members of the staff at M.I.T. were awarded United States Certificates of Achievement for participation in atomic energy tests. The certificates, granted "for meritorious service," were presented to the award winners by President Killian. Those cited were: CARL S. DOHERTY '48, of the Division of Industrial Cooperation; ROBERT J. HANSEN '48, Associate Professor of Structural Engineering; NORMAN P. HOBBS '48, research assistant in Aeronautical Engineering; LAWRENCE I. LEVY '48, research associate in Aeronautical Engineering; and RAYMOND L. BISPLINGHOFF, staff, Associate Professor of Aeronautical Engineering.

Pen and Platform

J. WHITNEY PERRY '31, of the department of Modern Languages at Technology, has just had published (Rheinhold Publishing Company) a book entitled *Punched Cards*, which he and Robert S. Casey edited. This book is described as "the first comprehensive summary of mechanical devices (and punched cards in particular) for scientific information problems."

The McGraw-Hill Book Company has published the second edition of *Television Engineering*, by DONALD G. FINK '33. In this book, Mr. Fink, who is editor of *Electronics* magazine, covers both the basic theory and all the latest developments in the design and operation of television systems.

MICHAEL V. HERASIMCHUK '39 spoke on "Tackling Failures on Industrial Equipment," at Lehigh University on December 12. Mr. Herasimchuk is maintenance metallurgist at Bethlehem Steel.

BURNHAM KELLY '41, Associate Professor of City Planning, and ROBERT J. HANSEN '48, Assistant Professor of Structural Engineering, both of M.I.T., spoke at the January 16 meeting of the Massachusetts State Association of Architects. Professor Hansen discussed shelter areas in buildings, existing and new; and Professor Kelly discussed the case for dispersal and decentralization of target areas.

DEANE LENT '42, Assistant Professor of Engineering Drawing at M.I.T., is the author of *Machine Drawing*, published by

Prentice Hall, Inc. This book can be used as a textbook or as a source of information for draftsmen.

JAMES O. McDONOUGH '43, of the Division of Industrial Cooperation at M.I.T., spoke on "Numerical Control of Machine Tools" at the December 20 meeting of the American Society of Mechanical Engineers, Boston Section.

Aid for Diabetics

THOMAS A. HEWSON, 6-45, engineer at Lessells and Associates in Boston, has designed a machine for automatically making blood sugar screening tests for the detection of diabetes. This machine, which is called the Hewson Clinitron, is the first to carry out the concept of automatism in medicine. The clinitron will make a blood sugar test in five minutes, automatically and without error while the patient is still present, thus speeding up the testing process to the point where preventative examinations would be comparatively simple.

Obituary

GEORGE P. VANIER '85, December 9.
FRED E. ELLIS '88, December 14.
FRANCIS H. FOSTER '92, June 26, 1950.
GROSVENOR T. BLOOD '93, October 24.
FREDERIC W. LORD '93, December 31.
GEORGE A. TAIER '94, November 30.
LEWIS B. BREED '96, November 10.
CONRAD H. YOUNG '96, November 16.
EDGAR L. BARKHOUSE '97, November 2.
HENRY F. HOIT '97, about July, 1951.
BURTON A. ADAMS '98, December 16.
HENRY F. SCOTT '98, August 30.
GEORGE A. PENNOCK '99, October 13.
CHARLES B. COBURN '01, December 4.
WALTER D. PRATT '01, December 14.
J. MURRAY WALKER '02, March 7.
HERMAN E. THOMPSON '04, December 17.
CARROLL C. CURTIS '05, May 5.
ELLIOTT LUM '05, December 8.
GRAFTON B. PERKINS '05, December 6.
CHARLES L. RODGERS '05, June 23.
JOHN M. McMILLIN '07, December 27.
J. THEODORE WHITNEY '10, November 28.
FREDERIC H. ADAMS '11, January 12, 1948.
WARREN B. HOPKINS '11, November 27.
JOHN E. KELLEY '11, date unknown.
HERBERT P. LARRABEE '11, September 22.
EVANS B. KEELING '12, July 4.
JAMES P. KING '12, November 6.
THOMAS B. LAWLER '12, December 25.
ROY P. WILLIAMS '12, October 31.
JOHN E. LONG '14, date unknown.
FRANK J. MAZZEI '14, January 16, 1945.
FRANK S. SMALL '17, October 21, 1950.
GEORGE C. DAVIS '18, November 29.
ASHER W. JOSLIN '18, November 6.
MRS. CHARLES D. SMITH '18, December 7.
HENRI J. CORMIER '20, November 6.
RUSSELL C. JOHNSON '21, December 3.
LON S. GREGORY '24, December 16.
SAMUEL SAMUELSON '25, October 26.
RAYMOND D. LEONARD '27, November 11.
MRS. FRANCES P. HOUGHTON '34, July 23.

*Mentioned in class notes.

News FROM THE Clubs AND Classes

CLUB NOTES

Boston Luncheon Club

The fall program of speaker meetings, although somewhat abbreviated, was quite successful both as to attendance and program. On October 18, Rogers Finch '41, Assistant Professor of Textile Technology at the Institute, told us of his visit to Japan last summer as a member of the engineering education mission sponsored by the Supreme Commander for the Allied Powers (S.C.A.P.). On November 15, Malcolm M. Hubbard '29, Assistant Director of M.I.T.'s Laboratory of Nuclear Science and Engineering, spoke of the present research program of that laboratory. This rather lofty subject was very nicely and interestingly calibrated to the average absorptive capacity of the audience.

The Program Committee is now preparing a list of speakers for the January, February, March, and April meetings. These meetings will be held at the Union Oyster House, 41 Union Street, Boston, probably on the third Thursday of each month at 12:15 P.M. The Old Guard is still holding down an M.I.T. table at Thompson's Spa, 239 Washington Street, and meets daily with a small but increasing attendance. Drop in any day 12:00 to 1:00 P.M. — FRED W. GOLDTHWAIT '05, *Secretary*, 274 Franklin Street, Boston 10, Mass.

The M.I.T. Club of Buffalo

The Buffalo Club started its 1951-1952 season as the guest of Chevrolet Motor Company, Tonawanda Motor Division. The plant visit was a great success and the Chevrolet cafeteria offered a splendid meal. The attendance was very good with 32 present at the meeting. For our next meeting, we plan to attend a museum talk on astronomy and to have a motion picture, which, as yet, has not been chosen. — ALFRED M. BRETSCHGER '48, *Secretary*, 60 Tremaine Avenue, Kenmore 17, N.Y.

The M.I.T. Club of Chicago

On December 10, 1951, at the Electric Club atop the Civic Opera Building, James M. Barker '07 gave approximately 100 Chicago members and guests a very interesting, informative, and timely talk on the Middle East. Mr. Barker, whose career has enabled him to see and live in many parts of the world, is chairman of the Allstate Insurance Company, and was an economic adviser on Iran for Overseas Consultants, Inc., as well as chief of mission in Turkey for the International Bank. He has always been very active in business and civic affairs and this fact, plus his

wide experience in the international field, made him pre-eminently qualified to give us an up-to-date summary on middle eastern problems. His acquaintance with practical, everyday economics and politics led one's thoughts in a direction that was quite different from that indicated by the daily press releases on such matters. Interest in the talk was such that a post-meeting discussion might have gone on for some time were it not for the fact that we had already drawn considerably on Mr. Barker's time. We are indebted to him and appreciate his generosity and consideration very much.

Those in attendance included Mrs. I. D. Thrasher, wife of Dr. I. D. Thrasher '27, one member from the M.I.T. Club of Milwaukee, the president of the Harvard Business School Club of Chicago, various guests, and the following Chicago Club members: L. H. G. Bouscaren '04, Arthur D. Smith '04, Lloyd C. Cooley '11, W. O. Whitney '11, Fred Mackentepe '14, Edwin D. Hale '16, E. F. Hanford '16, Robert E. Wilson '16, James P. Ferrall '17, Sherry O'Brien '17, Henry M. Barber '18, William R. Osgood '19, Edgar F. Seifert '19, Ben Sherman '19, F. B. Hunt '20, P. F. Lavedan '20, John W. Barriger '21, John O. Merrill '19, J. N. Duvernet '22, J. M. Cosgrove '22, P. L. Coleman '23, Louis A. Metz '23, Clarke C. Miller '23, W. J. Bagby '24, H. W. Kochs '24, A. A. Lauria '25, Frank O'Neil '25, C. E. Peterson '25, William Steinwedell '25, Bruce T. Humphreville '26, B. Y. McCarty '27, Louis Pirola '26, D. K. Taylor '26, John H. Wills '26, A. C. DeNapoli '27, Marvin H. Dixon '27, E. O. Jones '27, I. D. Thrasher '27, J. W. Gaffney '28, G. A. MacGillivray '28, J. K. Roberts '28, H. E. Ford '29, R. W. Clyne '30, C. R. Binner '31, Albert L. Kaye '31, Peter L. Loewe '31, G. Russell Eddy '32, Al Mulliken '32, Johnson Couch '33, H. T. Martin '33, Richard B. Smith '33, E. W. Spannake '33, Robert K. Roulston '34, A. S. Alschuler '35, B. S. Maximoff '36, L. E. Pepperberg '37, Yale Brozen '38, Arnold Goldberg '39, Harlan H. Davis '40, Harold Graham '40, F. R. Meyer '42, Bud Meissner '43, Barry Russell '43, Bob Faurot, 2-44, Sten Hammarstrom, 2-44, George Daskal, Jr., 6-45, Fred Heuchling '47, H. M. Matthews, 2-46, Rouholah Zargapur, 9-46, R. E. Bockhorst, 2-46, K. L. Block '47, John K. Reddersen '47, Robert L. Murphy '48, Jack C. Page '48, Robert L. Silberman '48, Andy Bigus '49, Bradford Endicott '49, Paul Gerhardt '49, David Hardin '49, Jerome D. Krinsky '49, S. J. Garvin '50, Thor Stromsted '50, Robert Byron Wolf '50, Gregor J. Gentleman '51, Martin D. King '51, and Arch Sheldon '51.

We regret to announce that George Colby Davis, Course VI, Class of 1918, died November 29, 1951, at his home, 123 Imperial Street, Park Ridge, Ill. He was district sales manager for the North American Manufacturing Company at the time of his death. He is survived by his wife,

Cormelia, a daughter, and his sister, Bertha Davis of Melrose. Our deepest sympathies to his wife and family. — HARLAN H. DAVIS '40, *Secretary*, Precision Rubber Products Corporation, 400 West Madison Street, Chicago 6, Ill.

M.I.T. Association of Cleveland

The first meeting of the 1951-1952 season was held on November 5 at the University Club and was a combined meeting to which wives and friends were invited. As usual, the combined meeting was a complete success and is thus encouragement toward insuring that this type of meeting will be an annual occurrence. The wives were particularly interested, in that Bernard E. Proctor '23, Professor of Food Technology and Acting Head of the Department, and Director of the Samuel Cate Prescott Laboratories of Food Technology, spoke about the problems of food preservation, including food freezing. The Alumni who attended the meeting are as follows: A. A. Gould '10, E. H. Weil '13, W. G. Loesch '21, H. S. Colton '21, C. H. Edwards '22, B. E. Proctor '23, T. J. James '24, W. H. Robinson '24, W. C. Sessions '26, E. E. Staples '26, F. E. Rhinehart '27, H. P. Ferguson '27, J. A. St. Louis '28, D. B. Wood '28, D. S. Connelly '31, J. R. Bird '31, G. E. Merryweather '34, G. R. Young '37, J. P. Auwerter '38, F. W. Reuter '38, A. R. Cherry '38, W. R. Stern '40, L. C. Turnock, Jr., '41, L. D. Fykse '41, C. H. Smith, Jr., '42, G. S. Colton '49, Miriam Strong '49, T. E. Weil '49, C. B. Whitmore '49, A. D. Pendleton '50, C. C. Morton '50, W. A. Farmer '50, H. C. Sharp '50, Richard Hammer '51, J. C. Staples '51.

Our next meeting was the annual student luncheon, held at the University Club on December 27. This, too, has become an annual event of tremendous importance to our Association. We hope that we are contributing to the future interest of each of the current students by having them see an active alumni association. We all regret that S. Floyd Stewart '24, a member of our Cleveland Board of Directors, has left Cleveland. Floyd was active in our M.I.T. work, and we hope he will continue to be interested by picking up his associations in New York. — G. RICHARD YOUNG '37, *Secretary*, The Weatherhead Company, 300 East 131st Street, Cleveland 8, Ohio.

M.I.T. Club of Milwaukee

The Club had its first meeting of the fall season on November 29 at the University Club. We had, as our guest speaker, Louis H. G. Bouscaren '04, who regaled us with stories and anecdotes of the early beginnings of M.I.T. and Stone and Webster Engineering Corporation. He emphasized, too, what it meant to be a Technology graduate and mentioned with enthusiasm the interesting and engaging work ahead for all M.I.T. gradu-

ates who may be planning to participate in the M.I.T. Educational Council. We had present at the meeting the following: Mortimer Allen'13, George Anderson'24, John Ballard'35, W. A. Bednar'50, W. R. Bohlman'49, Frank Briber'43, J. B. Cobb'37, Maurice Crowell'24, Fred Gruner'41, Arthur Hall'25, F. E. Hamilton'07, H. W. Huston, Jr., 6-45, Kenneth L. Holmes'51, Charles Jackson'49, Harold Koch'22, Philip Koehring'49, Martin Kuban'37, Franklin D. Mabbett'43, Chester Meyer'36, Jack C. Monday'51, John Schmitz'49, Dr. L. D. Smith'06, Emerson Van Patten'24, Milton Vogel'47, Stuart Westfeld'31, and a welcome visitor from the Chicago Club, Frank D. O'Neil'25.

On December 27, we held a Christmas luncheon at the Wisconsin Club for Wisconsin students home from Technology. Subsequent plans include the high school principals and preparatory school headmasters meeting on February 8, at which meeting Professor C. Stark Draper'26 will be our guest speaker; and a Valentine's Day party for the members and ladies on Thursday night, February 14th, also at the Wisconsin Club. — EMERSON J. VAN PATTEN'24, *Secretary*, 6160 North Kent Avenue, Milwaukee 11, Wis.

New Haven County M.I.T. Club

The New Haven County Alumni held their December 5, 1951, meeting at the American Brass Club in Naugatuck, Conn., where they had the pleasure of listening to F. L. Foster'25, Assistant to the Director of the Division of Industrial Cooperation, describe the functions of the Division. Dr. Foster's talk clarified many questions concerning D.I.C. and the Institute's policies toward research. He began by saying that D.I.C. did not direct research but was primarily concerned with making research contracts which were satisfactory to both parties and which protected the Institute from legal and financial jeopardy. Judging by the discussion which followed the talk, it may be said that the subject was of great interest to all present.

D. P. Severance'38, *Secretary* and *Treasurer* of the Alumni Association, who accompanied our speaker on his trip from Cambridge and through whose efforts we were able to have Dr. Foster, spoke about a program for bringing Alumni and prospective students together at local club meetings. He went on to say that M.I.T. is placing more emphasis on the undergraduate school now than it has in the past.

The following members were present: Fred Brooks'31, Jack Purinton'41, Walter Weeks'24, John Harsch'43, Richard Oppen'29, Stu Boyd'18, Mike Fenton'30, Joe Sullivan'48, Claude Tapley'50, John Gunnarson, 2-46, P. T. Wilson'28, J. E. Kearns'32, P. C. Mulkern'36, Milton Robins'47, Harry Manning'12, Alan Dana'15, Bob Gardner, 6-46, Ed Hartshorne'28, Roy Parcel'39, Herb Polleys'18, Cliff Lytle'37, Ellington Wade'36, Harlan Paige'28, Al Libbey'26, Marshall Wellington'16, Chester Randall'10, Arthur Rowley'38. — DAVID G. BLACK, JR., 6-46, *Secretary*, R.F.D. No. 2, Bethany, New Haven 15, Conn.

M.I.T. Club of Virginia

The postponed annual meeting of the Club was held October 10 at 12:30 P.M. at Hotel Rueger, Richmond, Va., and the following officers were re-elected: H. C. L. Miller'23, *President*; Colonel Oliver F. Marston'27, *Vice-president*; Arthur W. Davenport'23, *Treasurer*; John Skelton Williams, Jr., '22, *Secretary*; Somerby R. Evans'23, Donald N. Frazier'11, and Robert H. Kean'23, members of the executive committee. Before the election, Colonel Marston presided in the absence of President Miller, and, after minor modifications, the proposed new constitution, following closely the outline furnished by the Alumni Association, was formally adopted. In addition to most of the officers, those present included: William F. Bennett'35, Miles Cary'24, Richard H. Catlett'17, Michael P. Cummings, Jr., '41, Robert D. Faunce'34, Allan T. Gwathmey'28, Wilmot H. Kidd'32, Charles K. Lawrence'24, Alan McCullough'34, C. R. Outtersen'15, Harry A. Raddin'36, Livingston S. S. Smith'38, James B. Spratley'22, and Garland S. Sydnor, Jr., '49.

President H. C. L. Miller has gone on record as recommending strongly that the prime function of the Club should be to benefit M.I.T., especially in getting the most promising type of young men to go to the Institute and, incidentally, in this way aid Virginians in gaining the advantages of regional diversification of education. The suggestion has been made that this Club consider creating a scholarship to send one additional resident of Virginia to the Institute. Giving yearly book prizes to several outstanding science students in Virginia high schools has been proposed also. — JOHN SKELTON WILLIAMS, JR., '22, *Secretary*, Equitable Building, 5th and Main Streets, Richmond 19, Va.

CLASS NOTES

• 1885 •

Information has just been received of the death of our classmate George P. Vanier. We quote from the news clipping as follows: "George P. Vanier, 89, of 229 S. Fourth St., chief chemist for the Bethlehem Steel Company here [Steelton, Pa.] for more than 50 years before his retirement, died yesterday [December 9, 1951] at a hospital in Harrisburg. Surviving are his wife, Mrs. Helen M. Vanier; a son, George K., of Harrisburg; a daughter, Mrs. Martin G. Knott, of Baltimore, and four grandchildren." — ARTHUR K. HUNT, *Secretary*, Longwood Towers, Brookline 46, Mass. [Published in absence of class secretary.]

• 1892 •

The Secretary recently received a clipping of an article from the Los Angeles *Times*, featuring the architectural careers in California of two brothers, C. Sumner and Henry Mather Greene.

Born in St. Louis, 15 months apart in the early Seventies, of parents who were

descendants of General Nathaniel Greene of Revolutionary fame, they came to Technology after a course in Manual Training High School and attended the Course in Architecture, registered in the Class of 1892. After completing their Course here, they spent two years in Boston architectural firms, then went to Pasadena to visit their family who was residing there, and decided to open their own office, in the early Nineties. Quoting from the *Times*: "Pasadena had by then become a winter resort for wealthy families from the East and Midwest. These people were self-assured and secure; their values were native and original. They wanted houses which expressed their way of life. They had gotten over the naïve demonstrations of wealth and exuberance that inspired the ornate houses built after the Civil War. Their tastes understood simplicity, fitness and repose." The firm of Greene and Greene included in their list of clients David B. Gamble of Procter and Gamble; Charles M. Pratt of the Standard Oil Company of New Jersey; Mrs. Lucretia Garfield, widow of President Garfield; Henry M. Robinson, President of the First National Bank of Los Angeles; and many others prominent in the business enterprises of the day. Quoting again from the *Times*: "The years from 1903-1914 not only saw the culmination of their style. They also brought an end to their work. Greene & Greene seemed to realize that when war came in 1914 it meant the end of the serene way of life for which they had built. Instead of a cultivated class that could appreciate a craftsman's building, there was to be another class that sought a pretentious eclecticism." The brothers are now spending their retirement in the neighborhood of Pasadena; Charles S. Greene at Carmel, and Henry M. Greene at Altadena.

Harry Carlson sat at the head table at the first meeting of the Alumni Council this fall and was introduced to the gathering as the oldest living past president of the Alumni Association. Carlson reports that nearly finished him. He also reports that he and Mrs. Carlson will be at their winter headquarters in Florida soon after the beginning of the year.

Last summer I received a letter from Channing Wells stating that he had seen one of our classmates, Samuel Weis, Course I, of Chicago, who is living in the Seneca Hotel, 200 East Chestnut Street. Weis reported that he goes to his office every day as chairman of the board of the Illinois Electric Ventilating Company and is in good health. Wells spent the summer at his home in Sturbridge and wrote of his interest in the development in the town that his brothers have been working on for the past 10 years, "Old Sturbridge Village." It is a collection of early American houses, reproductions or restorations, filled with interesting collections of antiques of one kind or another. I suppose by this time Wells is in his winter home in California.

Soon after this is printed you should hear from the Secretary regarding plans for recognizing our 60th anniversary, probably a luncheon or dinner in the neighborhood of Boston. — CHARLES E. FULLER, *Secretary*, Box 144, Wellesley 81, Mass.

• 1893 •

Grosvenor T. Blood passed away October 24, 1951. He graduated with our Class in Course VI, and the following year received his bachelor's degree in Course II. He had been active and in good health up to the time of entering the hospital for an operation, which was not considered in the nature of an emergency. His death, caused by a heart attack following soon after the operation, was most unexpected.

Since leaving the Institute, and up to the time of his retirement, Blood had been continuously in the employ of only one company—the Bell Telephone Company, and its successor the American Telephone and Telegraph Company. Detailed accounts of his business career and social activities appear in the books published at the times of our 30th and 50th class anniversaries.

Since his retirement Blood had devoted considerable time to his hobby of weaving. He also enjoyed occasional hikes, and was an active member of the Green Mountain Club. Blood had always maintained a keen interest in the welfare of his classmates and in the affairs of the Institute, of which he was a loyal and generous supporter. He is survived by his wife, the former Elsie Louise Anderson, whom he married October 14, 1911; a son, Grosvenor Anderson Blood; and a daughter, Mrs. Barclay A. Kingman.—FREDERIC H. KEYES, *Secretary*, Room 5-213, M.I.T., Cambridge 39, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, 38 Chauncy Street, Boston 11, Mass.

• 1894 •

Once more it is the sad duty of the Secretary to report that death has taken one of our ever loyal and highly regarded classmates. George Aymar Taber, a graduate in Civil Engineering, and for some years a retired consulting engineer, died at his home, 1000 Main Street, Reading, Mass., on November 30, 1951. He had been hospitalized for an eye operation and was convalescing satisfactorily when he suffered a heart attack, and this and other complications were the direct cause of his death. He and his wife had added greatly to our five-year reunions, and his passing will cause deep regret to his classmates. George was born in Somerville, August 14, 1870, the son of Albert P. and Ada (Downes) Taber. The family moved to a large farm in that part of Wakefield known as Montrose, in the late Eighties, and there he lived while attending the Wakefield High School, from which he graduated in 1889. He entered M.I.T. in 1890, was an excellent student, and received his degree in '94. Upon graduation he was employed in New York on the "white wings" force of the famous Colonel G. E. Waring, Jr., the street commissioner. Here he soon became district superintendent and had charge of the district between Central Park and the Hudson River. His excellent service led to his appointment as assistant engineer in the Department of Water Supply and Electricity, and while thus engaged he was appointed professor of water supply and sewage disposal at the Brooklyn Polytechnic Institute, where he succeeded Professor George C. Whipple '89 in con-

ducting the evening courses in these subjects. He was connected with the Department of Water Supply for 12 years, he had charge of the designing division of the department in the borough of Brooklyn, and also supervised extensions of the distribution systems in the other boroughs. He was an active member of the American Society of Civil Engineers. While in New York, he also found time to study law as a hobby and side line.

Retiring in 1922, he made his home in Reading, Mass., was associated for a time with his uncle, Charles A. Taber, an attorney in Boston, and later became an official in a real estate and housing project in Lynn, Mass. During the Forties and until his retirement in 1950, he was president and treasurer of Pennell, Dearborn, and Hovey, Inc., managers of extensive factory and apartment properties. Taber was active in Masonic affairs, and held many offices, both in New York and later in Reading where he joined the Reading Commandery No. 50, Knights Templar, and also became a member of Aleppo Temple of the Shrine in Boston. Taber married Edna Dearborn of Winchester on October 25, 1900. Three sons were born to them: Wentworth D. (M.I.T. '28); Aymar H. (M.I.T. '29); and Albert M. All are living near Boston. Three grandsons and one granddaughter also survive him. All were present in October, 1950, when Taber and his wife celebrated their golden wedding anniversary. In recent years they had found opportunity to travel widely in the United States, including a motor trip to the Pacific Coast, at which time they contacted most happily several of George's classmates. Because of absence, the Secretary was unable to attend the funeral at the home on December 3, but a note of sympathy and condolence, which was both personal and as a representative of the Class, was sent and has received a gracious reply from Mrs. Taber.

The Secretary has recently heard, with regret, that George Haven is confined to his home in Laconia, N.H., by an attack of arthritis, or some other unpleasant affliction. It is hoped that, as Mark Twain said of the announcement of his demise, the report is "greatly exaggerated." At least it calls for a letter to George to get some information since he is notably reticent, as are so many others, in sending any news to the Secretary. Any information which may be obtained will be later reported.

That brilliant and versatile Charles G. Abbot adds to his Christmas greeting to the Secretary that he is "well and busy as ever, computing and writing. As the news is all bad, I pay little attention to the papers or the radio. I play golf every Saturday, and at last have learned how to putt, using a club I made myself." There is a chap who knows how to live as a "retired" but never inactive man.

A brief note regarding H. B. Dates was the leading item in the '94 notes in the December issue of *The Review*. It resulted in a letter from one of his lifelong friends in Cleveland, Ohio, and has provided information which the Secretary is delighted to quote as a part of the present notes. With gratitude to Willard C. Brown '16, the scant tribute to Dates's fine

career is now expanded, and it will be pleasing to all who were his classmates or his acquaintances to read the following: "Professor Dates, while head of the electrical engineering department at Case, became one of the best-known and loved men in the lighting industry, to which he contributed so much. For example, he was chairman of the committee which prepared and carried through the first American recommended practice of school lighting, an A.S.A. standard which has done so much to improve school lighting the country over—with who can estimate what great benefits to the eyes of our growing children. He served on innumerable committees and projects of the Illuminating Engineering Society, and was its national president in 1937-1938. Another of his outstanding contributions to lighting was his development of the I.E.S. 'Better-Sight' study lamp, for which he and his I.E.S. committee developed the original specifications. Literally tens of millions of lamps of this type, from the shops of hundreds of manufacturers, have improved lighting conditions in our homes. It was Professor Dates who initiated the I.E.S. researches on industrial lighting, elaborate case studies of specific industries, which have so greatly improved lighting practice in a score or more of industries. This project study work still continues and is in a very active state at this time. Yes, to the lighting industry, he was a grand—I should say great—man."—SAMUEL C. PRESCOTT, *Secretary*, Room 5-213, M.I.T., Cambridge 39, Mass.

• 1895 •

Alfred P. Sloan, Jr., chairman of the board of the General Motors Corporation, and cosponsor of the Sloan-Kettering Institute for Cancer Research, was awarded the annual gold medal of the One Hundred Year Association of New York on December 3, 1951. The presentation was made by Charles F. Kettering, consultant at General Motors and cosponsor of the cancer organization, at the association's 24th annual dinner in the Pierre Hotel. Mr. Sloan stressed the responsibility of business leaders to society at large for human progress. He asserted that inadequate human progress was responsible, in large measure, for the political and social chaos existing in the world today.—LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass.

• 1896 •

As of this writing, December 21st, the Class Secretaries offer seasons greetings to all. To those who have lost classmates and loved ones, may we extend our deep sympathy and assure them of the abiding loyalty of our Class. Had a nice letter from Mrs. Ralph Henry this week. She says: "We are spending the winter in Gilford, N.H. Came up here last April. Ralph is feeling fine again; leave it to our mountain country. We raised a fine vegetable garden this summer, and Ralph has just finished building a woodshed. He is very cheerful and busy with his water colors." His new address is "Far Horizon," R.F.D. No. 4, Laconia, N.H. We also have a new

address for Irving S. Merrell: 345 Eighth Avenue, N.E., St. Petersburg 2, Fla.

The deaths of two of our classmates, Conrad Young and Lewis Breed, were reported regretfully in the January issue of *The Review*. The following biographical material comes from news clippings and gives a bit more information about these two men: From the *New York Times* comes a brief report on Lewis Breed — "Springfield, Mass., Nov. 11 — Lewis B. Breed of Longmeadow, assistant treasurer and a founder of radio station WSPR, died yesterday in Springfield Hospital at the age of 76. Mr. Breed was graduated from . . . Technology and then joined the Westinghouse Electric Corporation in Pittsburgh. In 1920 he was transferred to the automotive section as a consulting engineer."

From the Hyannis, Mass., *Cape Cod Standard Times*, concerning Conrad Young: "Bass River, Nov. 17 — Conrad H. Young, 80, died unexpectedly yesterday at his summer residence, Bass River Parkway. Born in Canton, Ohio, he made Fort Myers, Fla., his permanent home, where he had resided for 17 years. He had been a summer resident of the Cape for 30 years. Mr. Young was the husband of Abby W. Rockwell, whom he married in 1902, and the son of William and Anna (Geiger) Young. A retired mechanical engineer, he worked for the Armstrong Cork Company. Mr. Young was graduated from Canton High School in 1891 with honors, from Worcester College in Worcester, Ohio in 1892, and from M.I.T. with M.E. degree in 1896. His class had its 55th reunion this year in Boston. He was one of six remaining members. A member of the M.I.T. quartet and originator of a musical club there, he was well known as a singer. After graduation, he was employed by Non-Pareil Cork Company in Bridgeport, Conn., as a mechanical engineer. In 1903, the Armstrong Cork Company bought out Non-Pareil and he was employed by the latter firm until his retirement in 1928. At one time, he was Eastern representative for the Armstrong company. He was in Washington during World War I, where he was a refrigeration expert. He supervised the building of many cold storage plants throughout the country and worked with the Navy in installation of refrigeration in vessels. He also worked with the Bureau of Standards at this time. He was a member of the Masonic Lodge in New Rochelle, N.Y., and also of Chevy Chase Presbyterian Church in Washington. Surviving is his widow." We have received the following note from Mrs. Conrad Young: "To Con's Classmates: Thank you for the beautiful flowers for Conrad. It was fine of you all to send them. He was fond of his classmates, and I am glad he could get to Boston in June. I am heartbroken. I will live in Bridgeport, Conn., with a devoted niece, Dr. A. E. Rockwell, 2210 Park Avenue, who has been like a daughter to us."

We are pleased to report that the amount in the Benevolent Fund is now \$1,725. The last report from our classmate Partridge finds him in a comfortable rest home in Brookline and his condition about the same. — JOHN A. ROCKWELL, *Secretary*, 24 Garden Street, Cambridge 38,

Mass. FREDERICK W. DAMON, *Assistant Secretary*, 275 Broadway, Arlington, Mass.

• 1897 •

Word has just been received (December 8, 1951), without further particulars, of the death in St. Louis, Mo., on November 2 of Edgar L. Barkhouse, Course VI. Edgar had been engaged in consulting electrical engineering work in St. Louis.

Proctor L. Dougherty is an honorary life member of the Washington Society of the M.I.T., and is a member of the executive committee. Jim Smith and his wife, of Litchfield, Conn., and Brimfield, Mass., are spending the winter at Largo, Fla. Up to December 12th, but four suggestions have been received for a 55th reunion. Two of these favor a reunion of several days' duration and two suggest a one-day affair with a dinner at some golf club or other location near Boston on the Sunday preceding Alumni Day. Apparently there is but little interest in the occasion. — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass.

• 1899 •

John B. Ferguson of Hagerstown, Md., writes me that the picture of the Western Maryland Railway engine in the December Review (page 81) especially interests him since he has been a director of that railroad for the past 14 years. He recognizes that the shot was taken just outside Hagerstown. In fact it must have been, as Hagerstown has a strict smoke ordinance. According to the J. B. Ferguson Company letterhead, the firm with eight members is engaged in construction, design, appraisals, developments, and survey.

Another classmate, Carroll W. Brown, Ferguson's thesis partner, is now located in Hagerstown and is supervising the construction of a big new V.A. hospital addition. In August Carroll went back to his old home in Rye, N.H., and, according to Waddell, drove 550 miles in one day to his home in Hagerstown. '99 men are certainly tough. Waddell spent his vacation at Cape Ann and in the latter part of December visited his son and family near Cleveland. He is busy with mine development work in Canada, Pennsylvania, Venezuela, Brazil, and Chile. In the Pennsylvania mine, two shafts are to be sunk 4,000 feet, which work will probably take at least three years.

George A. Pennock, who since his retirement has been living in San Marino, Calif., died on October 13 in that city.

Your Secretary was in the Memorial Hospital, Albany, from October 28 until December 16 and underwent one major and two minor operations, and is now completely "reconditioned." — BURT R. RICKARDS, *Secretary*, 381 State Street, Albany, N.Y. MILES S. RICHMOND, *Assistant Secretary*, 201 Devonshire Street, Boston 10, Mass.

• 1902 •

Dan is trying to get definite times and places for commencement events so that he can include them in his next reunion letter. If possible, he wants a special parking location for the 50-year Class, near a place where it can lunch after it

has served as Exhibit A at commencement. This should greatly facilitate getting started for the Cape and simplify the problems of our transportation committee. The Institute will furnish the caps and gowns for our appearance. In view of the fact that we had none of these trappings in '02 and that it will be a new experience for most of us, it is likely that there will be someone on hand to see that none of our slips show. Dan states that in the cases of those who on their return cards expressed a wish to see certain classmates at the reunion, he has notified each of the desired men, given the name and address, and has suggested correspondence.

Edward Henry Cutter of Elgin, Ill., writes: "Best regards to yourself and the boys of '02. I cannot come to the reunion. Not sick; just feel old. My wife does all the traveling and makes California at least once a year to see my younger son and three grandchildren. My oldest son is in Chicago and my daughter, with two sons, is in Wayne, Ill., eight miles south of here. Both sons are married." Referring to the war experience of his two sons, Cutter says: "Both boys enlisted in the Navy. The oldest son, Charles, was in the Navy Air Force and spent three years as deck executive on a baby flattop. Out as lieutenant commander. Route: Norfolk to Casa Blanca on convoy duty after subs. His worst experience was the Cocoon Grove fire in your old home town. Only 68 got out. His party of nine were near the only exit and all got out. Younger son, Henry, was commissioned as ensign and was made into a PT skipper. With MacArthur rounding east end of New Guinea, sunk by Japs, and given up. Five of the 12 were found on the fifth day hanging on to a rubber doughnut. Planes were hunting fliers. He was one of the five. After three hospitals, he got home and was later sent back. Made a lieutenant and is now a lawyer in Pasadena."

In answer to the question as to following the particular training of his course, Joe Ballard writes: "I did not make direct use of my mechanical engineering training. After graduating, I went into a family textile business of considerable age and obsolescence. This was the Griswoldville Manufacturing Company. I was with this company in various offices until 1932 when it was sold to the Kendall Company. I stayed with them until 1937 when, by mutual consent, I retired to give a treatment of outside work around the place to an old ulcer and other minor maladies." Along the line of vital statistics, he says: "In 1904 I married Mary E. Whelpley of Washington, D.C. We had a family of four — two boys and two girls. Both girls graduated from Mount Holyoke College. Mary, the older, later got a master's from Columbia in institutional management, and is now using her training in bringing up a family of five children. Margaret, the younger, got a master's at Tufts and a Ph.D. at Radcliffe, both in economics, and probably needs them in bringing up three children in Washington, D.C. The older boy, William, graduated at Dartmouth, got his Ph.D. at Yale, and is now a professor in zoology at Dartmouth. The younger boy, Joe, went to Antioch for two years, called it enough, and got himself a job. The grandchildren now total 12 boys

and seven girls." — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston 16, Mass.

• 1905 •

Clarke E. Warren, II, to whom we appealed (with others) for an obituary of Charlie Rodgers, whose death was reported last month, writes that he (Clarke) is in excellent health and quite unwilling to consider retirement, although his company's policy requires that next July. Clarke has been with this company for 27 years, manufacturing garment hangers and metal gadgets. He reports a growing second generation, having six granddaughters and one grandson living in the east, central, and far western states. The obituary is as follows: "Charles Loring Rodgers of 420 Oakwood Ave., Highland Park [Chicago], mechanical engineer who supervised the building of the Chicago stockyard died yesterday [June 23, 1951] in Highland Park Hospital. Mr. Rodgers was associated with Schmidt, Garden and Erickson, hospital architects and helped with the building of Chicago Lying-In Hospital and Monte Fiori Hospital, Pittsburgh, Pa., and Washington Hospital, Little Washington, Pennsylvania. He leaves his widow, Pluna. Burial at Binghampton, N.Y., Mr. Rodgers birthplace."

Ted Green, I, will spend the winter with his sister in Los Angeles. We have supplied him with the addresses of all classmates in California, and future class notes should give us more information from these far-away reticent brothers. Frank Longley, XI, in explaining a change of address, says that fleeting married children left him and the good wife rattling around in a big house, hence the storing of household goods and wintering in Florida. Frank is still vice-president of the Lock Joint Pipe Company, East Orange, N.J.

Carroll C. Curtis, IX, died at his winter residence, Falmouth Hotel, Portland, Maine, on May 5, 1951. He had not long ago expressed a desire to attend one more class gathering, but little other news except that he was serving as personnel manager of the Burrowes Company of Portland. Grafton B. Perkins, V, nationally-known advertising and merchandising executive and former vice-president in charge of advertising and market research for Lever Brothers in Cambridge, died on December 6, 1951, at his home, 100 Memorial Drive, Cambridge, Mass. Perk was a direct descendant of two Massachusetts governors — Thomas Dudley and Simon Bradstreet. Shortly after graduation he became advertising manager of the *Boston Post*. A few years later he took charge of the advertising for the Cuticura Soap Company, then in 1912 became head of advertising for the Reseriol Company in Baltimore. In 1917 he became a second lieutenant in the military intelligence branch of the United States Army. He saw service in the Pacific during World War I and was discharged as colonel. He took over as advertising head for the Richard Hudnut Company in 1920, holding that position until 1924 when he began his service with Lever Brothers, resigning in 1947 to set up his

own office as advertising and merchandising consultant to many leading companies in the East. During World War II, he was public relations director to Colonel Bradley, chief of the government's rubber program. He married Mary Wardwell of Salem in 1908, who died in 1917. They had two children: Grafton Brookhouse, Jr., of Lake Success, N.Y., and Mrs. Richard Cooper of New Britain, Conn. In 1920 he married Helen Edmonds of Grand Rapids and two children were born of this marriage. They are Captain Robert W. Perkins, stationed with the United States Army in Germany, and Mrs. Davis R. Dewey of Lincoln, Mass. The Class suffers a great loss. Perk has been for several years a very efficient class agent. — FRED W. GOLDTHWAIT, *Secretary*, 274 Franklin Street, Boston 10. SIDNEY T. STRICKLAND, *Assistant Secretary*, 69 Newbury Street, Boston 16.

• 1906 •

The Secretary will steal a few minutes from the Christmas preparations in order to have some class notes in this issue. These notes are being prepared on December 18 and Christmas cards are already being received from classmates. Thanks to the Secretary's good wife, our cards are on the way, in many cases including our personal notes which she takes great pleasure in sending. I am sure if it were not for the Secretary's wife, classmates would not receive as many cards as they do. It is fortunate for the Class and the Secretary that she is so much interested in class affairs. Although readers will be perusing this a month after New Years, it may be that this is the first opportunity the Secretary will have to extend New Year's greetings to all classmates.

Under date of December 3, a letter was received from Abe Sherman, parts of which are included below: "I told you at the reunion that we were selling our home in Fitchburg, buying one in Rochester, and that I would write you later. We moved our possessions August 15 and, while ordering an early breakfast in a Fitchburg restaurant before starting on the road to follow our goods, who should blow in but Allyn and Mrs. Taylor. They were on their way back to Reading after closing their cottage in New Hampshire. It was a pleasant surprise to see them even for just a moment. Our new home here is just what we had dreamed of to finally settle down in. We are about seven miles from the center of the city in nice clean country air. The house has six rooms, all on one floor, with a nice storage attic and attached two-car garage. The grounds are really quite beautifully set out with trees and shrubs. We have about one and one-third acres, one-half of it in the house lot surrounded by a low stone wall. The other half is woods where we have a tool house for the heavier and larger equipment. There is a nice rose garden besides a general flower garden, and we are awaiting spring with much anticipation to see just what does come up. Our present plans are to leave just after Christmas for Sarasota, as usual, but having been so upset and occupied this fall we didn't reserve our former apart-

ment so we will scout around when we get there and find something to our liking. Our location here is about one-half mile south of U.S. 104 (205 Rye Road, Rochester 13) and three miles west of the Genesee River, and we would be delighted to welcome any classmates that pass this way. Route 104 is the direct Niagara Falls road. Rochester has one of the most active alumni groups, meeting once a month. I have taken in two meetings and can say it is a great crowd. Ogden Adams, who was at M.I.T. in our Class, is an active member of the group. I think you met him at the Victory Dinner in New York. Best regards, and Mrs. S. joins me in wishing you and yours a very Merry Christmas and Happy New Year and may the golf course remain open to play all winter." The Secretary appreciates Abe's reference to the golf course but regrets to report that several inches of snow fell on December 14, which probably closed the golf season for 1951.

The Secretary was very pleased to receive a note from Dr. Lem Smith dated in Milwaukee, December 13, which he will reproduce here, if classmates will pardon the compliment which Doc paid your scribe: "I just read again your fine write-up of the '06 meeting in the November Review. I think it was especially well done and is a fine memento of a successful gathering, thanks to your efforts. The legend to the photograph gives it added value. If you ever happen to be in this vicinity, please make my home your abode and headquarters. Kindest wishes of the season." With reference to that write-up it should be stated that Mrs. Secretary contributed part of it and she should share some of the praise which Doc has bestowed upon me.

I trust all readers noted the picture of the Class on page 36 of the November issue. The subjects involved generally agreed they thought that it was a very good picture. To classmates who have not seen us for some time, undoubtedly we may look old but after all there isn't much we can do about that, and considering we have been out of Technology 45 years I think we probably do not look any older than any other group with the same number of years over their heads. The picture was taken by a local photographer in Harwich by the name of Stephen B. Moody. Classmates might be interested in an anecdote which Ralph Patch told about him. Ralph, by the way, has a married daughter living in Harwich who taught music in the Harwich schools before her marriage. She began teaching just out of college and Ralph said some of the older boys in the school were inclined to heckle her, young Moody being one of them. She got around it very cleverly by picking out four of the older ones with better voices and getting them to form a male quartet which became quite famous in that section of the Cape and they were quite in demand as an entertainment feature. Needless to say, this method of arousing the boys' interest took care of the discipline problem, and young Moody is now a man of judgment and discernment as he told us it was the best-looking group he had ever taken. Undoubtedly that is the stock phrase which goes with every picture. For the

amateur photographers it might be added that the pleasant expression was obtained by getting us all to say "cheese" as the picture was taken. I tried this on a picture of my granddaughter and it came out very well so I can recommend it as being worth a trial.

A very attractive Christmas card has been received from Chester and Mrs. Hoefler. The envelope was decorated with three pictorial Lebanon stamps and the picture on the card is entitled "Old city street Jerusalem." On the back of the card is inscribed: "Hand painted by Palestine Arab Refugees." Apparently the Hoeflers have resumed their foreign travels and at the time of sending the card were in the Holy Land. — JAMES W. KIDDER, *Secretary*, 215 Crosby Street, Arlington 74, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills 82, Mass.

• 1907 •

On the evening of last November 30, seventeen members of our Class assembled in the Silver Room at Walker Memorial, Cambridge, for dinner and an evening of pleasant companionship. The following men were present: Dick Ashenden, Gene Banfield, Clinton Barker, Howard Chase, Bill Coffin, George Crane, Paul Cumings, Parker Dodge of Washington, D.C. (who stopped off to attend our dinner on his way from Washington to Bangor, Maine), Ellis Doucette, Bill Egan, Tom Gould, Harry Moody, Bob Rand, Gilbert Small, Oscar Starkweather, Phil Walker, and myself. After the dinner I told the men about activities of some of the members of our Class, of whom I had learned chiefly through replies which had been received regarding attendance either at this affair or at our June reunion; and then we were entertained and enlightened regarding the country of Argentina in South America by Albert Callens, who is associated with the foreign sales department of Whitin Machine Works of Whitinsville, Mass., manufacturers of textile machinery. This is the company by whom Gene Banfield, Phil Walker, and I are also employed. Albert was born in Argentina, lived there for the first eight years of his life, and has returned to that country at various times since, so that he is thoroughly familiar by personal experiences with the social, economic, and political history and present situation in that country. All of the men who were present expressed themselves afterwards as having greatly enjoyed Albert's personality and the talk which he gave.

In the December, 1951, Review there was a brief letter from John Frank written from Rome, Italy. Upon his return to his home and business in Chicago, Ill., where he is president of Ilg Electric Ventilating Company, he prepared a long letter which he distributed to all of the employees of his firm telling in detail of his trip. He kindly sent a copy of this letter to me, and from it I quote: "Mrs. Frank and I and our daughter Patricia flew from New York, October 5, 1951, by P.A.A. stratocruiser and landed in London the next morning. Some American friends of our daughter living in London drove us

to Cambridge Sunday morning, and we spent most of the day there. Cambridge, like Oxford, is an ancient university, dating from the 11th and 12th centuries and is a collection of colleges, each college more or less distinct with separate dormitories, rectangle, and so on. King's College, one of the oldest, has the magnificent King's College Chapel which has been called by one observer 'the most beautiful church in Christendom.' The Cam River winds through the Cambridge campus and makes a most attractive scene, filled with flat-bottom boats, called punts, that are pushed along with poles. The students were just arriving that day for the fall term, and many of them were on the river. Cambridge and Oxford are certainly two of England's great assets, because these great institutions offer unequaled educational advantages to both men and women in England and to a certain number of students from other countries. It is rather inspiring to think of great universities that have gone on through all the changes in English history for almost 900 years. Coming back from Cambridge late Sunday afternoon, we found ourselves in the thick of a real London fog, something that we had missed entirely on our last trip to London. We ended up in a very quaint inn on the Thames that must have been built at least 500 years ago, and we eventually reached London without mishap. The next afternoon we flew to Paris, which is just a hop of an hour and a half. Paris, this time, was just a way station on our trip to Italy, but we again stopped at our favorite Hotel Continental and revisited the spots and restaurants that we remembered from our last trip. Paris in October is gray, serene, and beautiful. After four days in Paris, we flew to Rome, T.W.A., a beautiful flight directly over the snow-covered Alps, seen far below. This flight takes only three hours, nonstop. At last we were in Rome, our main objective for this trip. We were housed at the Hotel Hassler, a very fine new hotel, on the site of an old one, located at the top of the famous Spanish Steps with a magnificent view of a large part of Rome. Rome is built on seven hills and, as a result, one obtains magnificent views of the city and surrounding country from all of them. The Pincio, on which we were located, contains the famous Pincio Park and Gardens, the Villa Medici, and the magnificent Borghese Museum, one of the great art galleries of the world. We spent a total of 18 days in Rome, divided up into three different trips, and I believe we saw most of the principal churches, museums, fountains, ruins, and parks. However, it would be necessary to live in Rome for at least a year to become fully familiar with all of the points of interest. Rome is truly 'The Eternal City.' You see the ruins of the Colosseum, the Roman Forum, and the various other forums, built by Julius and Augustus Caesar and Emperor Trajan. In the Forum Romanum, which is the old and original one that dates probably from the fourth century before Christ, you find the senate house in which Caesar was stabbed by Brutus in 44 B.C. Standing in that spot, you feel that 20 centuries are looking down and, with a little imagination, you can reconstruct the life of a Ro-

man citizen of that day. Incidentally, the Colosseum is not a ruin that has crumbled and eroded. Actually it was such an enormous structure of masonry that it became a virtual stone quarry for the building of many of the great churches of Rome. Today, approximately half of the original structure is still intact and when you examine the thickness of the walls, columns, arches, and the size of the stones themselves, you realize that this structure was built to be imperishable. The new Union Railway Station in Rome, built with E.C.A. money, is the finest one that we have seen anywhere, of wonderful modern design and completely functional. All over Rome you find that new apartment buildings, some 10 and 12 stories high, are being built and these, too, are all completely modern in design. Rome has many fascinating fountains, all of them in continuous operation because there is no lack of water. The famous Trevi Fountain, one of the most magnificent, has connected with it the fable that if you throw a coin into it, you will surely return to Rome. Needless to say, we threw in a coin. Of course, the high spot in Rome is the Vatican and the great Church of St. Peter's. The Vatican, as you doubtless know, is a separate state, covers 25 square miles and has its own police force and municipal government and also contains the palace of the Pope. Much of the Vatican is not open to visitors, but St. Peter's, the Vatican museum, the library and, of course, the Sistine Chapel are open, and many interesting hours can be spent in these buildings. St. Peter's simply staggers the imagination for its size. It is unquestionably the largest church in the world, consisting of a series of many chapels and completely decorated with many fine examples of painting and sculpture. It is also magnificently illuminated. We were fortunate to be in Rome on All Saints' Day and attended a special mass at which Pope Pius XII officiated. As a result of a letter given to us by Casey, of our company, to the head of the American Catholic College in Rome, we had wonderful seats for this mass. We were in our seats at 9:00 A.M. in the morning, and for one hour the great church slowly filled with the most colorful pageant in our memory. The famous Swiss palace guards in their brilliant uniforms, the cardinals, visiting church dignitaries, nuns, priests — in blacks, reds, purples — all produced an unforgettable picture. At exactly 10 o'clock the Pope appeared, borne aloft in his golden chair on the shoulders of eight sturdy guards, and at once the great assemblage broke into a burst of applause and cheering. A wonderful chorus provided the music and at the end the Pope pronounced the benediction and, as he was carried out of the church, again borne aloft, he repeatedly blessed the entire great throng. This was a never-to-be-forgotten experience. After our first stay of 10 days in Rome, we went by train to Florence. This particular train, the *Rapido*, one of the finest on which we have ridden, is all electric and makes the run of 180 miles in approximately three hours. Luncheon is served at your seat in package style, à la airplane, and it strikes us that this is a very practical way to serve meals on a train and might

well be copied by American railroads. Florence, after Rome, seems small, serene, and beautiful with the River Arno dividing the city into halves. We were fortunate to be located at the top of the Hotel Excelsior, with a beautiful terrace in front of our room, which gave me an opportunity to do a lot of water-color painting without moving from that spot, as practically all of Florence lay in sight below. I said that Florence is serene and it is, perhaps, from midnight to six o'clock in the morning. The rest of the time it is a city of noise because the streets are filled with automobiles, motorcycles, and motor scooters that dash along at 50 to 60 miles an hour with seeming disregard for pedestrians. As a matter of fact, the traffic in Paris, Rome, and Florence is indescribably dangerous. Fred Allen, after a recent trip to Paris, wrote his impressions of the Paris traffic that might well cover Rome and Florence as well. We quote him as follows: "The visitor is impressed by the number of churches in Paris. There is a church on every corner and it has been put there for a purpose. It enables the pedestrian to stop in and pray that he will be able to safely cross the street in traffic. Traffic in Paris cannot be described; words would have to be invented. It is a symphony of tumult rendered by taxis, cars and bicycles, all striving to attain a crescendo of chaos." Florence contains many fine restaurants. Our daughter Patsy gave us a wedding anniversary party on October 20 at Buca Lapi, an underground cave that is one of the best restaurants in Florence with an open kitchen in the middle and steaks broiled over a charcoal fire. Incidentally, the food in Italy is excellent in most of the restaurants and even with spaghetti, ravioli, and other starchy foods, you readily obtain a balanced diet by drinking copious amounts of red and white wine. Another impression of Florence is that it is an absolutely fireproof city. There is hardly a stick of wood anywhere, because everything is built of stone, marble, and tile and the streets are solid chunks of smooth cobblestones. An Englishman living in Florence, who later drove us through the Hill Towns, told me that he had been living there three years and, to his knowledge, there had only been one fire. That was in a cinema and was supposed to have been set. Rome, too, and, I assume, other cities in Italy, are similarly fireproof and when you consider the enormous price that we pay in this country for fire losses, it is readily seen that Italy has a tremendous economic asset in this fact. On our way back to Rome from Florence, we spent three days visiting the famous Hill Towns. We were fortunate in securing a very fine and comfortable Italian car, a Lancia, and an English driver who was an excellent guide. We first visited San Gimignano, a remarkable ancient town with a most surprising number of huge rectangular towers. We next stopped at Siena, where we stayed overnight at the Hotel Excelsior. Siena is a charming, ancient city and incidentally manufactures many of the very fine briar pipes that are sold in England as 'English Briars.' Looking out of our hotel window in Siena, we saw a stadium with a football game in progress. This reminds us that

football in Italy (we call it soccer) is a tremendous sport that must be approximately the equal of baseball in this country. While in Rome, we saw a football game in progress in the new Mussolini Stadium and that is one of the most interesting things in Rome. Mussolini is largely a forgotten name in Italy, as far as we could tell, but his name is still attached to this very magnificent stadium, completely surrounded by heroic statues of athletes and in front of the stadium a stone column dedicated to Mussolini Dux! Whether that will continue to stand or not remains to be seen. We also visited Perugia, a most beautiful little Hill City, famous for its art treasures and its candy, and late in the afternoon drove over to Assisi, which is only 15 miles away. Back in Rome, we gave a farewell party for our daughter Patsy who flew home ahead of us on November 2. Mrs. Frank and I continued to sight-see in Rome for several days with perhaps the high spot the Capitoline Museum. From Rome, we found that we could get to Sicily very easily by air and we therefore flew to Catania, stopping in Naples on the way. The great volcano, Mt. Etna, approximately 12,000 feet high, is in constant minor eruption, pouring forth a brownish smoke. We also had a good view of Vesuvius. It was interesting to think that within the short space of an hour and a half, we had full view of two of the world's most famous volcanoes, Etna and Vesuvius. Back in Rome for the third time, and by this time the staff at the Hotel Hassler treated us as old-timers. We repeated on some of our favorite spots and restaurants in Rome and on the last day took a drive to Villa Sciarra, which is one of the most beautiful spots in Rome, a magnificent park with a gorgeous view of practically all of the city. This park is on the Janiculum, one of the seven hills. We again flew back to Paris and this time by P.A.A. instead of T.W.A. We passed over Corsica, Nice, and Cannes, with the outlines of these famous places clearly visible from the air. In Paris, again we retouched all of our favorite Parisian spots, galleries, museums, Notre Dame, Sainte Chappelle, the Louvre, and so on. We gave ourselves a farewell dinner at the famous Café de Paris, one of the finest and most popular restaurants in Paris, and, incidentally, the kitchen is ventilated by an Ilg fan, one of the very few in Paris. On our last day in Paris, we drove to Park Monceau, one of the beauty spots of Paris. This beautiful little park has many fine trees, shrubs, and flowers and is surrounded by some of the finest old residences and de luxe apartment houses in Paris. The park once had many bronze statues mounted on stone bases. During the German occupation in World War II, all of these statues and many others in Paris were removed by the Germans and presumably sent back to be melted up for war purposes. Our flight home on the P.A.A. strato-cruiser was somewhat exciting, in that we landed at Shannon and Iceland, due to strong headwinds, had a four-hour delay in Iceland for a minor repair, and then struck out for the long trek direct to New York, which we reached without incident, but five hours late."

Only about four months remain before our 45-year reunion at Oyster Harbors Club, Osterville, Mass., June 20-22, 1952. I hope you are definitely planning to attend. — BRYANT NICHOLS, *Secretary*, 23 Leland Road, Whitinsville, Mass. PHILIP B. WALKER, *Assistant Secretary*, 18 Summit Street, Whitinsville, Mass.

• 1910 •

It is with deep regret that I announce the passing of our classmate J. Theodore Whitney. The following is from the *Boston Globe*, November 28, 1951: "J. Theodore Whitney, 63, retired colonel, United States Army Engineers, veteran of two wars, former Wakefield town official and engineer-contractor, died today at Melrose Hospital of a heart condition. A native of Wakefield and a graduate of M.I.T. 1910, Col. Whitney was president of the Whidden-Beekman Company, Boston, contractors. Throughout his life he was active in civic, religious and patriotic affairs in Wakefield. He had served, in the 1920's, as chairman of the Board of Selectmen, on the Board of Appeals and as a trustee of the Lucius Beebe Memorial Library. He was a leading layman in the Universalist Church, ex-president of the State Universalist Association and a director of the local Y.M.C.A. and Red Cross. A past commander of Cpl. Harry E. Nelson Post, A.L., Col. Whitney in 1945 was awarded the Croix de Guerre by the French Government and also given an honorary degree by the Sorbonne University in Paris, honoring his work in restoring public utilities and sanitation after the liberation. He leaves his wife, Mrs. Grace Whitney of Wakefield; twin daughters, Mrs. Donald K. Corwin of Southampton, Long Island, N.Y., and Mrs. Robert N. Warren, Ames, Ia."

Bob Burnett announces that he is now a registered representative for F. S. Moseley and Co., with his office in Fall River, Mass. Walt Spalding writes that he is very busy in Hawaii on A and E contracts for the U.S. Army.

Hiram Beebe writes as follows: "I am leaving on December 17 for a reunion with my family at Christmas, for the first time in nine years, in Omaha. I am leaving the office of secretary of this Club of Southern California in January, after four years of very interesting work. The Club is in most excellent shape, and I know will continue to grow. We welcome all outsiders to our sunny climes, and will appreciate any Alumnus who plans on coming here getting in touch with me, if possible, in advance. Our Governors' Meetings are on the first Wednesday of each month; a noon luncheon."

Ray Jacoby has sent me reprints of two articles which recently appeared in the *American Dyestuff Reporter*. As reported in the December issue of class notes, Ray was awarded the Olney Medal, which is the highest award of the Association of Textile Chemists and Colorists, for outstanding achievement in the field of textile chemistry. Excerpts of the presentation speeches by C. Norris Rabold, president of the A.A.T.C.C.; W. George Parks; and Elliot Broadbent, I am sure will be of interest to the members of the Class: Mr. Rabold's speech: "Because of your exten-

sive knowledge in the field of textile chemistry, the committee unanimously decided you were eminently qualified for this award. Over the years, you have constantly brought forth new ideas and methods. With your advice and assistance, many of us have become better chemists and better technicians. Not only by your own direct efforts, but also through your willingness to impart your knowledge and ideas to others have you aided the progress of our industry. By word and deed, your contributions to our scientific advancement have been many. . . . Everyone knows you as a friend, everyone appreciates your unselfishness, everyone realizes what you know is his for the asking. I stress these qualities for they are definitely in keeping with the objects of our association and decidedly fitting for the recipient of this award. May this medal always remind you of our esteem for you as a man and our respect for you as a scientist." — Dr. Parks's speech: "It is frequently difficult to evaluate properly the tangible and intangible contributions of an individual to science, to the particular profession involved and to the civilization in which we live. It is sometimes necessary to apply the test of time and also to await the results of a critical review by qualified judges. However, in the case of Raymond W. Jacoby these difficulties are not encountered and it is easy to recognize immediately an outstanding leader in the textile industry and worthy recipient of the 1951 Olney Medal Award. Textile processing has been the principal interest of our 1951 Medalist during his professional life. His varied interests are indicated by a partial list of the problems investigated, such as tensile strength of cotton yarns, production of jacquard effects by printing cotton fabric with a design and process for production, treating printed or dyed fabrics and processes for improving the fastness of dyed fabrics. Important contributions to science and to the textile industry have always resulted when Ray investigated a problem. He has always been ready to serve the industry whenever possible. Many important contributions have been made to the dyeing and finishing problems on textile fabrics for the Armed Forces." — Mr. Broadbent's speech: "Some time ago I was returning from the South with our Medalist. We had spent about a week together going around various plants, and in that time we had discussed about every phase of the textile business and particularly the finishing industry. Finally, I asked Ray, that if some rich relative were to leave him a lot of money, would he invest it in a finishing plant of his own? 'No,' he replied, 'I would start a nonprofit research group specifically to handle problems of the textile industry.' I was somewhat surprised and asked him why he would choose to use his money that way. He replied, 'The finishing business and the textile industry in general have given me a good living all my life and I would feel that I was making some measures of repayment.' I think that characterizes the man, particularly in this day when everyone asks 'What's in it for me?' While it may appear that the Medalist takes a pessimistic attitude toward every problem he tackles, such is not really the case. It is

merely a manifestation of his attempt to envision every possible exigency which might arise and take steps to prevent failures before they can possibly happen. He is always looking to the future; what has happened, right or wrong, is water over the dam as far as he is concerned. So long as he has learned a lesson from the past, he knows that he is better equipped to face any difficulty of the future. His interest in local affairs has always been one of Mr. Jacoby's strong points. He has always been very active in the community and in the church, and has done an outstanding job in raising funds for his church. Although a comparative newcomer to Mountain Lakes, N.J., he has practically reached the status of a 'town father' in that community. At one time he was made chairman of a citizen's committee organized to preserve the quality of the community by checking an unsatisfactory real estate development. These accomplishments, which I have taught Ray, are indeed small repayment for the many things he has taught me. I believe that anyone associated with him can say the same thing. He has proved himself a man in the highest sense in every walk of his well-balanced life. The AATCC should be proud that it has such a man in its organization. We all should be happy in the Olney Medal Committee's choice."

—HERBERT S. CLEVERDON, *Secretary*,
120 Tremont Street, Boston 8, Mass.

• 1911 •

Once again a special honor has come to our Class; this time with the election in early December of Bun Wilson, XIV, as one of six new life members to the Corporation of M.I.T. The announcement listed him as Irving White Wilson of Pittsburgh, Pa., Director and President of the Aluminum Company of America and former term member of the Corporation. In a letter of congratulation, your Secretary told Bun how proud we all are of him, and in reply he stated, in part: "I feel that this is a real honor and only hope that I can, as a member, make some contribution to M.I.T. Unfortunately, in these busy days one does not have much assurance as to what he may be able to contribute. It was a real regret to me that I was unable to attend our 40th reunion. I know how much I would have enjoyed seeing many of our classmates, most of whom I do not otherwise cross paths with. More specifically, I would have obtained very real satisfaction from being able to express to you the regard and high esteem in which we hold our class secretary and the real pleasure we had in giving you some tangible evidence of that feeling." Thanks much, Bun, and I repeat: We're proud of you!

We're also proud to learn that a favorite class name goes on, for announcement is at hand that Mr. and Mrs. Donald Read Stevens'43 herald the birth, on December 12, of Donald Read Stevens, 3d, at a hospital in Wilkes-Barre, Pa., where Read is working at Okonite's Hazard Insulated Wire Works factory. Their home is at 210 Hamilton Avenue, Glen Rock, N.J. That's great news, Don and Lois — 1911 rejoices!

Just prior to this mid-December writ-

ing of these class notes, the first report on Alumni Fund XI (1951-1952) has been issued, and it shows that 1911 has the largest number of contributors to date — 54 — of any of the "Boston" classes (prior to the Class of 1916, first to graduate in Cambridge). That's fine, although it represents but 35 per cent of the record 159 subscribers we had in the 1949-1950 campaign, the Alumni Fund having been omitted a year ago in favor of the remarkably successful C.F.D. \$20,000,000 endowment campaign. The figure of 32 per cent, however, compares favorably with the total alumni current figure of 32 per cent; but our total of \$969 through November 30th is but 26 per cent of our total of \$3,752 two years ago and the overall figure of 37 per cent. There is still time for us to catch up, and in previous drives, when 1911 has risen to a high spot in the final reckonings each year, a lot of it has come in the late days of the campaign.

In the past 30 days, word has reached me of the death of four classmates, the first notice via a note from Mrs. Frederick H. Adams of Poquonock Bridge, Conn., advising belatedly that her husband passed away January 12, 1948. A native of Brooklyn, N.Y., Fred prepared at Polytechnic Preparatory School in that city and received his S.B. with us in Course XIII, Naval Architecture. At the Institute he was an active member of the Naval Architectural Society and upon graduation accepted a position with a shipbuilding company in New London, Conn. In the early 1940's he returned to Brooklyn as a consulting engineer, finally returning to Noank, Conn., near New London, in late 1946.

Word was received from the Alumni Office of the death this fall of John E. Kelley, IV, exact date unknown. He had been employed by the Boston architectural firm of Blackall, Clapp and Whittemore almost continuously since he left the Institute because of illness during our junior year. He had lived for years at 71 South Main Street, Randolph, Mass.

Herbert P. Larrabee, VI, assistant plant superintendent at Graton and Knight Company, Worcester, Mass., until his retirement two and a half years ago, died September 22d at his home, 26 Navasota Avenue, Worcester. He was born in Medford and had lived in Worcester 35 years. He was with us at M.I.T. during the first two years of our four-year course, and he leaves his wife, the former Bessie T. Kinread, four sons, and six grandchildren. Burial was in Woodlawn Cemetery, Acton, Mass.

Warren B. Hopkins, VI, died November 27th at Salem Hospital, Salem, Mass., and is survived by his wife, the former Doris Phillips, Ballast Lane, Marblehead Neck, Mass. For years they lived at 250 Beacon Street, Boston. A native of Holton, Kansas, he was educated at Horton High School and Purdue University before joining us during our sophomore year. Shortly after graduation, Warren founded the National Company of Malden, Mass., manufacturers of radio transmitters and appliances — a very successful company now headed by Bill Ready '13. He spent many years with Stone and Webster Corporation of Boston, finally

becoming vice-president and general manager, retiring about a year ago. He was also a director of the Ames Shovel and Tool Company, Boston, and a member of the Sons of the American Revolution and the Eastern Yacht Club, Marblehead. In addition to his wife, he leaves two sisters: Edna, of Marblehead, and Mrs. Newton Bevens of New York City. Burial was in Duxbury, Mass.

A stockholder, director, and designer for the F. A. Whitney Carriage Company of Leominster, Mass., Harold F. Shaw, II, came to Gardner on December 1 to assume the presidency of the Arlington Chair Company, an affiliate of the Thayer Company. Harold tells me that for the present he and his wife will maintain their home at 43 Orchard Street, Leominster, less than 15 miles from Gardner. Harold started with the F. A. Whitney Carriage Company in 1912—one year after graduation—and in his 39 years of experience there he has been foreman of both the carriage body and reed departments, a superintendent, and a designer of reed, fiber, and wood carriage bodies. It was under his direction that the company started its line of cribs, chiffonades, chests, and other nursery items. As president of Arlington Chair Company in Gardner, he will be responsible for the design, development, and production of the Thayer lines of nursery furniture. Coincidental with Shaw's appointment, the Thayer interests announced the purchase of the nearby Mahoney Chair Company. This chair-manufacturing plant will be operated under Harold's direction as Thayer Furniture Division of Arlington Chair Company.

General George Kenney, I, who, as new president of the Arthritis and Rheumatism Foundation, is actively directing the national campaign for funds, was in Boston for a New England chapter campaign luncheon at the Harvard Club November 27th. It was my good fortune to attend, with the Gardner chairman, and we had a fine chat with George who said he and his wife, Alice, are very happy in their new home at 21 Wildwood Road, Scarsdale, N.Y. At the luncheon he told the group of campaign workers that while he had retired from active service in the armed forces, he was still working for national defense; for the drive to control arthritis is a move to overcome the enemy's one tremendous advantage, manpower.

Always good "copy," I found upon entering the Club that George was surrounded by a group of Boston newspaper reporters, and the next day's papers had reported interviews with him. Summing up, George, who was our Pacific wartime air chief, stated that with their vastly greater strength in fighter planes, the Communists probably could bomb us out of Korea if they so desired. He added that the United Nations had lost control of the air on the embattled peninsula and it would be a tough job to get it back. The quick way, he said, would be to bomb Russian planes on the ground north of the Yalu river—the MacArthur program—which is not permitted to our fliers. The hard way would be to build up equality in numbers of fighter planes. He called for terrific reinforcement of UN

planes in Korea, asserting that "it's quite a job to destroy the enemy when we can't bomb him beyond the Yalu river." Flash! Here comes the January issue of *Reader's Digest*, with the book section featuring a condensation of George's book, *The MacArthur I Knew*. The foreword reads: "Here's an unusually candid and intimate portrait of General MacArthur by a distinguished soldier who served under him. All straight talk . . . highly readable," says *The Saturday Review of Literature*. Lewis Gannett, in the New York *Herald Tribune*, calls it "a warmhearted book of stories based on the tough years of the Southwest Pacific." New information on the General's early life and colorful glimpses of him on the battlefield make this a memorable biography of a great American."

Gordon B. Wilkes, II, Professor of Heat Engineering at M.I.T., has written a new book, *Heat Insulation*, published by Chapman and Hall, Ltd., 37 Essex Street, London, England. Rather than being a textbook, it attempts to bring together in one volume—for the engineer, architect, and student—some of the miscellany on heat insulation. The need for a book that would assemble such information under one cover has been evident. Gordon has been closely connected, ever since graduation, with the development and application of equipment to determine the effectiveness of heat insulation over a wide range of temperatures. One chapter is devoted to a brief discussion of various types of test equipment, some of which information has never before been published. Another important chapter is that dealing with the subject of reflective insulation, in which Wilkie presents original data and information, some of which is the result of his own investigation. Other chapters cover fundamental mathematical formulas (a knowledge of calculus is assumed), factors affecting the coefficient of thermal conductivity, types of insulating materials, moisture in insulation, and the economics of insulation. In an appendix, a number of tables of useful data are given, followed by a very complete bibliography.

It is fine to hear directly from Norm DeForest, III, Maitland, Fla., fruitgrower and shipper, who was the victim of a near-fatal auto accident in early July. He writes: "Mighty glad to report that I am on the job again—not 100 per cent, but am making a pretty good pretense. I really had a rough time, with 24 bones broken and a compound fracture of skull. I was in an oxygen tent for four weeks right after the accident. Your accident (October, 1915) happened when you were a young man. I am afraid today you would not snap out of it so quickly in fact sometimes I am quite discouraged over not regaining my strength more rapidly. Needless to say, I regret exceedingly my inability to attend the 40th reunion, which took place before I closed my packing house for the season. I hope we both live so that we can renew old times for the 50th reunion!" Why wait for the golden anniversary reunion, Norman—come to the 45th!

One of the principal satisfactions of a class secretary is receiving a letter from a classmate long silent, so it was a particu-

lar pleasure to hear recently from Norman Nelson, 221 Hyers Street, Toms River, N.J., a Course VI-mate. He wrote: "Just a friendly note to say if you ever happen to be down this way, stop in. I'm one block east of New York-Atlantic City Boulevard 44 and two blocks from the post office. This is wonderful county for a person to retire in (illness forced me out): mild winters, pine trees, sand, river, Barnegat Bay and the ocean, and sometimes fishing; also signs along some of the roads saying 'Deer Area.' Have been inactive for a long time, financially and otherwise, due to long illness, but I enjoy seeing my old friends."

Co-operative jobs have brought a total of about \$3,000,000 to 3,000 Northwestern University students—all or most of their college expenses during the last college year—President Carl S. Ell, XI, told his corporation members at a meeting last month. "During 1950-1951 the co-operative work program reached a new peak as 14 full-time co-ordinators supervised 3,000 students on 1,500 jobs provided by 600 co-operating companies," he said. "Every co-operative student in the university is working on some job. We cannot begin to supply the engineering students demanded from us on our basis of a student alternating 10 weeks of work and 10 weeks of study." In conclusion he told the corporation members of the need for new engineering and law school buildings on the university property in the Back Bay district of Boston, and reported that the \$1,500,000 library is now completed. In an earlier interview, published in the Boston *Globe*, Carl said: "Our experience with veterans has been most satisfactory. They are earnest, purposeful, well prepared. Their grades have been slightly higher than those of civilian students, not because they have greater ability, but because of greater incentive. There have been many fewer withdrawals than I had any idea there would be and when the going gets tough, these veteran students just grit their teeth and dig in. Their wives have been just as determined as they to have them educated. Veterans have asked no special considerations—just a chance to learn."

Next construction is to be a gymnasium and cage on the present parking lot on the west side of the Huntington Avenue campus, to be followed by a law building at the rear. "We think we do quite well in athletics," Carl added with some pride, "in spite of the fact that our best pitcher or star halfback may be drawing pictures on a drafting board at the time he needs to support the team, or our boys may have to get up at 4 A.M. to come in for hockey practice." He said, with emphasis: "The only security that ever will be lasting is the ability to produce. These kids have it. They are willing to work. They know they are going to have problems, but they know where to take hold of them. Pasteur said it long ago: 'Chance favors the prepared mind.'"

I was sorry to read recently of the death of Edward L. Besse of Mashpee, Mass., 89-year-old father of Cap Besse, II, and, acknowledging a letter of sympathy, Cap wrote: "Sorry to have missed the party at Snow Inn, since this loss has brought home the fact that I will be 68 at the next

reunion. Well, here's hoping to see you all." A recent three-column cut in the Boston *Herald* showed Albert O. Wilson, Jr., '38, son of Al Wilson, I, with his year-and-a-half-old son, Mark, in the center. It was in connection with a group of leaders in Hancock Congregational Church of Lexington, Mass., celebrating the completion and dedication of a new parish house, for which young Al had been chairman of the building committee. He is presently superintendent of his dad's A. O. Wilson Structural Company in Cambridge.

Here are two address changes: Marcus A. Grossmann, III, United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.; Mrs. Mayo Tolman, VII, North Scituate, Mass. — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Gardner, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford 55, Mass.

• 1912 •

We regret to announce the death of James P. King of Peabody, Mass., who passed away on November 6 at the J. B. Thomas Hospital at Peabody. He had been at work up to noon of the previous day at his desk as manager of the Municipal Light Department. After leaving the Institute, he was instructor of mathematics and science in Bath, Maine, later becoming principal of the school. He returned to Massachusetts where he served as instructor of science and principal of the high school in Stow for eight years and then moved into the Maynard school system, where he served as superintendent of schools for an eight-year period. During the war he was inspector of construction at Fort Devens and later on was with the U. S. Engineer's Department in Boston. Mr. King is survived by his wife and two daughters.

We also regret to report the death of Roy P. Williams of Essex, Mass., who passed away on October 31 after a long illness. For many years Roy was a buyer for several Boston department stores. Several years ago he opened an antique store in Essex, Mass., where he did a very interesting business. — We are sorry to announce the death of Evans B. Keeling of Dallas, Texas, who passed away on July 4. Unfortunately, no further details are known.

The following is an excerpt from the minutes of the meeting of the Art Commission, which held its meeting on October 8, 1951: "Commissioner Foster presented the following resolution, which was unanimously adopted: 'Resolved, That the Members of the Art Commission record their regret that Eric Kebbon will retire on January 1, 1952, as Architect of the Board of Education, a post that he has filled with distinction for more than thirty years, and be it further Resolved, That this note be entered in the Minutes as a permanent record of the appreciation of the Art Commission for what Eric Kebbon has done to beautify the City of New York through his skill as an architect.'"

Bill Bird, President of the Prophylactic Brush Company in Florence, Mass., writes that he expects to be on hand for the reunion. Drop the Davis boys or your Secretary a card saying that you will also

be there. — FREDERICK J. SHEPARD, JR., *Secretary*, 31 Chestnut Street, Boston 8, Mass. LESTER M. WHITE, *Assistant Secretary*, 4520 Lewiston Road, Niagara Falls, N.Y.

• 1914 •

A very fine letter was received recently from Harold Danforth, who has spent almost the entire time since graduation in the telephone industry, partially in this country but more particularly with the International Telephone and Telegraph Corporation in connection with their South American activities. This work previously required his living both in Argentina and in Chile. He retired in November, 1950, and at once joined a technical organization known as the National Scientific Laboratories, with headquarters in Washington. This group does special scientific work for the government, and Danforth was assigned to an Air Force project at Wright-Patterson Field in Dayton, Ohio. It is expected that this work will continue at least until next summer. His wife and youngest daughter, who is a secretary at Wright-Patterson Field, have moved from Long Island to Dayton to be with Danforth. Danforth also writes that he has met a number of Technology men and old telephone acquaintances since he has been in Dayton. One of his early contacts, made entirely by chance, was that of our classmate, Myles Maxim, who is located there with the Monsanto Chemical Company. In addition to his daughter at Dayton, Danforth has two other daughters and a son who are married and living in the New York area.

A note from Bob Moorhouse tells that he, too, has retired and is now living in Bryn Mawr, Pa. Bob was for many years associated with Goodyear and rather closely with our classmate and prize storyteller, Ray Dinsmore, who is vice-president of that organization.

From our Assistant Secretary comes word that he had to spend a week in the hospital for a minor operation, but is now back on the job again in the Standard Oil family. Apparently, Ross has received quite a number of contacts from '14 men because of the error made in one of the Alumni Fund letters which reported his being in Massachusetts instead of in New Jersey.

While in New York recently, your Secretary chatted with Charles Fiske only to learn that he is giving much attention nowadays to foreign travel. This was to be preceded by a hunting trip in Maryland. By the time these notes appear, Charles should have been down through the Caribbean, and he has plans laid out for traveling around Europe, beginning about May 1.

The Alumni Office has recently cleared two of the "address unknown" listings of members of our Class. Unfortunately, in both cases, it was learned that the two men had died. They are: John E. Long who came to the Institute from Hudson, Mass., and for some time prior to his death had lived in Framingham, Mass.; and Frank J. Mazzei, who came from Chelsea, Mass., and who, in the years preceding his death, had made his home in Swampscott. Although Frank died early in 1945, this information was just received by the

Institute. Both men were with the Class only during the first and second years. — H. B. RICHMOND, *Secretary*, 275 Massachusetts Avenue, Cambridge 39, Mass. ROSS H. DICKSON, *Assistant Secretary*, 126 Morristown Road, Elizabeth, N.J.

• 1916 •

The mailman teased us a little this month by holding off until the last minute before bringing us news from our classmates. Thanks for coming through for us, fellows. We received a unique Christmas card from Herb Gilkey. All in all, there were 21 different snapshots grouped together on one standard-sized post card, and these pictures showed very conclusively that the Gilkey clan has been increasing and multiplying in accordance with the direction of the Good Book. Herb's greetings were: "Merry Christmas 1951 From a lot of Gilkeys." Thanks a lot, Herb. It was good to hear from you again.

We were very surprised to learn that Irv McDaniel has been on the move again. You will recall that Mac went into retirement and was going to content himself for his remaining years by raising avocados, but how quickly that picture has changed. He came out of retirement to help in the project on atomic weapons which centered around Las Vegas, Nev., and which recently reached the testing stage and was headline material for a number of days. Now he is over in Hawaii on another special project. We received a nice Christmas card from him and this note: "How I missed our reunion; but I was up to my ears in work at Frenchman's Flat (Nevada). We finished in time and the tests went as scheduled. Then I went to Port Mugu on guided missiles — then came out here for a two-week job and have been here ever since (four months). Kay flew out and joined me. We have a wonderful studio apartment on the beach at Waikiki. We hope to fly home for Christmas. Never worked harder or had a better time in my life. The heck with retirement. Probably go to North Africa next in time for a Holy War." More power to you, Mac. All we ask is that you keep us informed of where you are going and where you have been.

We had a short letter from Ed Williams, wishing us a Merry Christmas and a very Happy New Year. Ed is still providing plenty of competition for Frank Ross in the insurance field. Ed also mentioned that he hoped to be with us at the next reunion. You will recall that at the time of the 35th, illness in Ed's family made it impossible for him to attend. Blythe Stason pleased us with this message: "You ask for a few words bringing you up to date on my latest activities. The humdrum of existence continues unabated. I am still dean of the University of Michigan Law School, very far removed indeed from the good education in electrical engineering which I acquired at M.I.T. I can only say that I am doing my best to carry on my tasks as well as I can, and no one can do more. I find that advancing years take their toll, but I am still always on hand when the dinner bell rings. Best wishes to my classmates of 1916." It certainly is good to hear from

you again, Blythe, and we hope that you will continue to write us often in the future.

We received this letter from Frank Ross: "I don't remember when I last wrote you or what I was doing at the time, but I'm still with the Factory Insurance Association, as I have been for more than 25 years now, and just this last March, when the president retired, they kicked me upstairs into his job. Life would be a lot easier if it weren't for the fact that two of our chief competitors are Ed Williams and Hovey Freeman. We try to keep a jump or two ahead of them, though, but it isn't always easy. Still trying to play golf, but each year it seems like the holes get longer, and every time I go to putt somebody moves the hole. But I have a 20-year-old son who is quite interested in the game so we play in some father and son tournaments and I let him carry the load for a change. I am playing in the U. S. and Seniors' Tournaments and having a lot of fun with some of those old boys." With the lessening of your activities on the golf course, there may be a chance for one of us old duffers to catch up with you at the next reunion, Frank. Better not cut out too much of the golf.

A letter from Bill Drummey tells us that he has been practicing architecture as an individual since November after selling his interests in the Drummey-Duffill Corporation. Bill's address is William W. Drummey, Architect, 80 Boylston St., Boston 16, Mass. Good luck to you, Bill. Ed Hewins writes: "It must be a devil of a job being class secretary, and I am sorry to have put you to so much trouble. So here are a few notes in longhand now rather than a more finished typed job later—which might never materialize. I was married to Eleanor Chamberlain (Springfield, Mass.) in 1918. I have three children and five grandchildren—four grandsons and one granddaughter. Granddaughter, aged four and one-half, is a knockout. Am living in the old home town and still working for the Newport News Shipbuilding and Dry Dock Company in the engineering technical department. (Have been in the shipyard since 1916.) This fall, along with two coauthors from the General Electric Company, received the Joseph H. Linard prize for the best paper presented before the Society of Naval Architects and Marine Engineers in 1950. The subject of the paper was 'The Backing Power of Geared-Turbine Driven Vessels' and was a report of rather extensive and expensive trials financed by Newport News and General Electric Company which yielded considerable new and useful information. My training on *The Tech* helped, no doubt. Local activities include membership on the County Board of Supervisors, Community Chest Board of Trustees, and Boy Scout Executive Board. Hobbies are sailboating and color photography, to which I would like to add model railroading (even more expensive and useless than the other two), but since my grandsons are all out of town, there is small chance of getting into this." A very nice letter, Ed, and with the talent that you have displayed in this letter, in your prize-winning paper, and your training on *The Tech*, we feel that you should

have little if any trouble in writing to us often in the future.

We were glad to have word recently from Ben Kerstein, from whom we have not heard for some time. Ben writes: "Gassed during World War I. My health has been such that I could not do the many things I cared or was prepared to do. Spent a number of years in New Mexico 'health seeking,' meanwhile puttering around with mining and highway engineering. Have been with the Massachusetts Department of Public Works as engineer on highways off and on for many years, a position that doesn't require too much exertion. Have traveled extensively through France, Italy, Mexico, and Canada on pleasure trips. Married but no children. Hobby, gardening. Had to give up golf; too strenuous." Perhaps at some time in the near future, Ed, you could take a few minutes to write us and tell us of some of your interesting experiences in your travels throughout the foreign lands.

Rudolf Gruber sent us his wishes for a happy Christmas and a prosperous New Year, along with this note: "It seems that I am always somewhere across the Atlantic whenever our gatherings are due, but I hope to make the 40th—the good Lord willing. My last European jaunt, from which I have just returned, took me through Spain, Italy, Germany, France, and England. The primary purpose was to visit manufacturing plants for antibiotics, in the construction of which my firm has contributed. In this connection, you might be interested in reading the article, 'Helping Our Foreign Neighbors,' which appeared in the November issue of our house organ, *The Merck Review*. Incidentally, this publication also relates the activities of one of our most famous classmates, Vannevar Bush." In reading *The Merck Review*, we learned that Vannevar Bush is on the Board of Directors of Merck and Co., Inc. We also have abstracted the following paragraphs from the article, "Helping Our Foreign Neighbors," which appeared in this house organ: "They don't wear striped trousers or tail coats, but the ambassadors of goodwill from Merck and Co., Inc. perform an important mission in international cooperation. They are the negotiators and the chemists and engineers who help foreign companies set up new plants under Merck licensing agreements covering processes and patents. . . . Our Government, through its Point IV program, encourages the export of American know-how to the underdeveloped areas of the world. The Merck licensees, though some of them are located in more highly industrialized countries, are contributing to the same goal of increased production and higher living standards. . . . The two Merck products in greatest demand in foreign countries are penicillin and streptomycin. Although foreign production of these antibiotics has been increased by Merck licensees and others, world demand continues to be strong. These products still cannot be supplied promptly in quantities sufficient to meet demand, and Merck continues to export penicillin and streptomycin in considerable volume. . . . One of the newer Merck licensees, whose plant was dedicated in September is Compania Espanola de la Penicilina y An-

tibioticos, S.A., which has its headquarters and a sterile techniques subdividing plant in Madrid, as well as a fermentation plant in Aranjuez. Vice-President R. E. Gruber and George W. Merck Jr. represented our company at the ceremony dedicating this plant."

We received this letter from Don Webster: "I read the write-up on the reunion in *The Review* with great interest, and it made me sorer than ever that I could not have been with you all. It certainly was a prize turnout in numbers, considering the age of the animals, and I do think it would be nice if we could have some sort of small gathering every year for those men who could find the time and opportunity to get back. Five years between gatherings is a little too long these days. One day I will give you a little write-up for the *Review* class notes, which I promise will be very prosaic." We'll be looking for that letter, Don, and in the meantime you and the others will be interested to know that right now we are kicking some ideas around for a class get-together before too many more months pass.

Newspaper clippings bring us the following reports on activities of our classmates: From the *Nassau Review-Star* in Hempstead, N.Y., we received this item on Ed Macy: "The 32nd show of the Art League of Nassau, exhibiting original oil paintings by Edward W. Macy of Oceanside, opened today on the mezzanine of the Calderone Theater in Hempstead. The paintings in the French Impressionistic school are of sunrise and sunset scenes on South Shore Long Island where the wild Mallard Ducks fly in for breakfast and supper. Macy studied in Belgium and France and received his early training at Fitchburg, Mass., Normal Art School and . . . Technology. He was supervisor of fine arts in the Sussex County, N.J. public school and a pupil of many years of Harry DeMaine, an associate member of the National Academy. A recent show of 100 Macy oils, painted in the Red Hook section of South Brooklyn before commerce and industry eradicated many historic landmarks, was held at the Long Island Historic Society in Brooklyn. Macy lives on Deep Hole Creek, Oceanside, in two converted fishing shacks and does much of his painting from the decks of his own fishing trawler." *The Transcript-Telegram* of Holyoke, Mass., carried an article on Arthur Stewart, from which we have taken the following paragraphs: "Arthur K. Stewart of Stanford St., agent of the American Thread Co. mill in Holyoke since 1942 was named agent of the Willimantic Mills, Willimantic, Conn. . . . Mr. Stewart was a Lieutenant in the Coast Artillery during World War I. After the war, he joined the Lonsdale Co. and later became agent. In 1937, he went to the American Thread Co. as agent of the Westerly, R.I. plant. That mill was wrecked by the September 20, 1938 hurricane, and later that year the operations were transferred to the Merrick Mills of the American Thread Co. here. Mr. Stewart directed the transfer and was in charge of operations here until August 1939, when he went to the company's manufacturing department office in New York. He returned to Holyoke in 1942 as agent of the mills here. Mr. Stewart is a

trustee of the Holyoke Savings Bank, and belongs to the Rotary Club. He has been active in Community affairs with the Community Chest and Red Cross. He is married to the former Frances M. Plumb of North Adams, Mass., and they have a son Robert, who is divisional superintendent of the Whitin Machine Works at Whitinsville. They have two grandsons."

Here is an item which appeared in the *Times*, New Milford, Conn., and which refers to the activities of Allston Storm: "Storm Haven Farm on Long Mountain is one of the most scientifically run farms in the New Milford area from every standpoint—sanitation, record keeping, planning, soil analysis and fertilization, feeding of stock, saving of labor. The place is owned by Allston E. Storm. Mr. Storm is president of Storm and Klein, Inc., an advertising agency with offices at 50 East 42nd Street in New York City, but farming is not a hobby with him, it is a business. He spends fifty-two long weekends a year on the farm, coming out from New York on Thursdays and occasionally spends a week there. His background is such as to help him considerably in farming. He majored in chemistry at . . . Technology, studied medicine and later studied soil chemistry. He has a laboratory in his farm home where he tests the soil before, during and after crops so that he knows at all times the needs of the soil. He also has a complete agronomy library. Registered Ayrshires are featured on this farm, and Mr. Storm likes to talk about Ayrshires and tell of the careful breeding that went into them in their native Scotland to produce the present high udder, of how Ayrshire milk has smaller fat globules than any other milk, making it more digestible for babies, and of all the other superior features of his favorite breed. Storm Haven has twenty-six milking cows (twenty-two Ayrshires and four Jerseys), and twelve young stock, all purebred Ayrshires. Seven to ten cans of Grade A milk are sent to the Beechmont Dairy in Bridgeport daily. . . . In 1950 the total production was 206,757 lbs. of milk." Allston is one '16 man who found those greener pastures.

From far across Scotland, the *Stirling Observer* carried this article: "The 'Glasgow News' reported on Thursday night something which 'Observer' readers have known for some years now thanks to the fact that I have from time to time quoted to them from the scientific work of Richard G. Berger, President of Cancer Prevention, Inc., 1928 North Ave., Bridgeport, Conn., USA. 'Smoking Causes Cancer' was the 'Glasgow News' heading. It reported that representatives of the B.M.A. and Royal Society of Medicine were told on Thursday that smoking causes cancer. Dr. W. R. S. Doull, who is on the staff of the statistical unit of the Medical Research Unit, London School of Hygiene, said that investigations at twenty London hospitals forced them to the conclusion 'that smoking must be a cause of cancer of the lung.' Smoking fifty cigarettes a day gave a risk of something in the order of fifty times as much as non-smokers." Dr. Doull said he smoked when the investigation began but was now a non-smoker. I, too, used to smoke forty cigarettes a day. After reading Berger's ir-

refutable mass of data I signed off for good two years ago. Each day evidence accumulates that American Scientist, Richard Berger, has been right on the beam on the cancer question, years before many other workers in the same field." We have considerably more material on Dick's activities and will try to carry more of it in our future columns.

That does it for this month. We hope you are enjoying the column.—RALPH A. FLETCHER, *Secretary*, Post Office Box 71, West Chelmsford, Mass. HAROLD F. DODGE, *Assistant Secretary*, Bell Telephone Laboratories, Inc., 463 West Street, New York, N.Y.

• 1917 •

This edition of the notes was to have been straight from the Midwest, with Sherry O'Brien's inimitable editorial touch on news of the Chicago area. Unfortunately, the post office did not function as expected, and the pleasure of hearing from Sherry has had to be postponed to a later issue. He assures us, however, that he is "busy working on the Chicago members of the Class to migrate east, come 35th reunion." Further plans for this celebration will undoubtedly develop during the midwinter alumni meeting in Boston the end of January, when a group plan to gather in advance in Lobby's place at 100 Memorial Drive for an informal social session.

Our warm congratulations go to Walt Beadle on his election, in early December, to life membership on the M.I.T. Corporation. Brick Dunham has been appointed general superintendent of the Lewis Shepard Company. Paul Childs, who is president of Childs, Jeffries and Thorndike, and of Chain Stores Investment Corporation, has been elected a director of Nedick's, Inc.

We were all pleased to learn of the appointment of Roger Putnam as economic stabilization administrator last November, in which job he succeeded Eric Johnston. Roger prepared at Harvard, served as a Naval officer in both world wars, and was mayor of Springfield, Mass., from 1937 to 1943—the first man in that city's history to serve three terms. Businesswise, he is president of the Package Machinery Company in East Longmeadow, Mass. Not content with his political and business activities, however, Roger Putnam has also earned a fine reputation as an astronomer, and is the sole trustee of the Lowell Observatory at Flagstaff, Ariz. It would seem as if a price stabilization administrator should have a background in astronomy, in view of figures he has to cope with in the national economy!—RAYMOND STEVENS, *Secretary*, Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass. FREDERICK BERNARD, *Assistant Secretary*, 24 Federal Street, Boston 10, Mass.

• 1918 •

Accompanied by a photograph which looks as though it might have been taken shortly after stiff collars went out of style, the *Newark News* printed an article concerning Bill Wyer's elevation to the position of general trustee of the notorious Long Island Railroad. This \$30,000 job is

in addition to Bill's responsibilities as president of his own consulting firm which has offices at 6 South Clinton Street, East Orange, N.J. Occasionally college instruction does cast its shadow before, for this civil engineer's thesis was titled, "A Project for the Installation of Block Signals on the Boston & Maine Railroad, North Cambridge to Gleason Junction, on the Northampton Division." Since the Boston and Maine has been singularly free of accidents, we predict that battalions of commuters will soon have faith in the Long Island Railroad again.

Other promotions are also taking place. James Arthur Flint has been made vice-president in charge of engineering at the Jeffrey Manufacturing Company. Kenneth Reid has promoted himself to the intelligent life of a country squire. He no longer remains disastrously complacent in the spiritual emptiness of skyscrapers and subways, but has lifted up his eyes to the green hills of Vermont (*Vert Mont*, if you remember your French), where he is book editor for the F. W. Dodge Corporation. Just in case you do not know, Dodge is probably the foremost publisher of architectural books. John Coleman Purves is president of his own corporation with offices at 983 Memorial Drive, Cambridge, Mass. He's recently been in England, reason deponent sayeth not, and has since been "reposing in the peace that follows the excitement of foreign travel and the month of arriving home." He goes on to state, as his main item of news: "We have acquired two more grandchildren since the 30th reunion, and now have a total of three. I correspond fairly regularly with Wirt Robinson who is one of the mainstays of the Sun Oil Company and lives near Philadelphia. He has a grandchild parked somewhere beyond Jamaica Pond. I collect a few royalties now and then for something called 'Flux valve' which helps keep the wolf from the door."

Bunny Pinkham is with the Lehon Company of Chicago, manufacturers of Mule-Hide asphalt shingles, roll roofing cements, insulation, and so on. Bunny says: "I was very glad to receive your letter recently because it seems a long time since I have had any communication from anyone of the Class of 1918. Unfortunately I have been unable to attend any of the reunions, but if there is one in Chicago, I shall do everything I possibly can to be there. I am one of the black sheep who never worked at the engineering profession, having been in sales ever since I left the Institute. I am now sales manager of the Lehon Company, doing a business in the vicinity of 10 million dollars a year. We live in Winnetka on the North Shore on the lake and find this part of the country a very agreeable place in which to live. My home address is 719 Foxdale Avenue, Winnetka, and I am usually in town, but frequently have to be away on business. So let me know well in advance."

And finally, that paragraph which will eventually include us all. There are other areas beside engineering or sales which have their kinds of truth to discover and to communicate. Yet, beside the unknown is also the unknowable, including things we have to die to find out, or to be for-

ever oblivious to; no one knows which. On November 6, Asher W. Joslin died in Port Chester, N.Y., leaving a wife and son. He had been manager of the egg department of the Atlantic and Pacific Tea Company in the Bronx for the last 24 years. — GRETCHEN A. PALMER, Secretary, The Thomas School, The Wilson Road, Rowayton, Conn.

• 1919 •

Recently had a card from Mrs. Bess Fichter, whose comment was: "No change of news, but there is a change of address to 3313 Taney Road, Baltimore 15, Maryland."

Had a very nice letter from Jack Fleckenstein giving a brief outline of his Alaskan trip last August by car — 9,000 miles in 27 days. He mentioned that the Alcan Highway is a wonderful piece of engineering and in excellent condition, but it is too long a highway and monotonous. There was no wildlife of any kind along the highway due to the fact that some 50,000 American soldiers were stationed along its length for four years with free rifles and free ammunition plus liberal supplies of dynamite for fishing purposes. In summing it up, he said the people in Alberta, British Columbia, and the Yukon are the nicest people one could meet anywhere in the world and he is looking forward to another trip to Whitehorse and the Yukon. Your Secretary met Jack at the A.P.I. Convention in Chicago last month but the visit with him was all too short.

Congratulations from all of us to Stuart J. Hayes. His twin daughters presented him with a granddaughter apiece last summer — June 20th and July 1st, respectively. His final comment was, "hence feeling old." We also extend our congratulations to Herman A. Herzog who writes: "No change in business or address; nothing exciting to report except our first grandson, Mike Jones. Quite a character."

A very interesting article appeared in the November 15th issue of the Gardner, Mass., *News*, in connection with Rod Bent who is head of S. Bent and Brothers, manufacturers of chairs and, exclusively, the "Douglas Office" chair. The article continues: "Gardner, Mass. is a long way from the world's movie capital at Hollywood, but Gardner chairs are very important props in most of the Western movie barroom scenes. Under the title 'The West Sat Here' Chester Newton Hess sets forth the history of the West's most lasting bit of furniture, the 'Douglas Office,' manufactured for years by S. Bent & Bros. well known South Gardner firm. Mr. Hess writes that the chances are 100 to 1 that the chairs one sees in Western movie barroom scenes in which everyone is sitting around casual like are Bent products." Continued success goes out to Rod from all his classmates. — EUGENE R. SMOLEY, Secretary, The Lummus Company, 385 Madison Avenue, New York 17, N.Y.

• 1920 •

At the Chemical Exposition in New York early in December, your Secretary had the pleasure of brief visits with Hank Caldwell, Dick Gee, and Art Radasch. He

looked for Tony Anable, who is generally there, but didn't have the luck to find him. Hank is with the Swenson Evaporator Company and within the year has taken a business trip to South America. Mrs. Caldwell went with him, so it was a pleasure trip as well as a business trip. Dick Gee, who runs the Beetle Boat business in New Bedford, was a visitor at the show, as was Art Radasch who is head of the chemical department at Cooper Union. Tony Anable is with the Dorr Company.

Pete Ash has left New Jersey and is in New York City, address 100 Park Avenue. Clint Bond is back from Bombay and his present address is 8 Crandall Street, Adams, Mass. Scott Carpenter has left Watertown and is in Lexington, address 260 Lincoln Street. Ed McCarthy's new address is 41 Cliff Road, Wellesley Hills. Harold W. Stiegler, who got his master's degree with us, is now director of research for the American Association of Textile Chemists and Colorists, and he is also a lieutenant colonel in the Officers' Reserve, Chemical Warfare Service. Hugh P. Duffill of Drummey-Duffill Inc., architectural firm, has recently received acclaim for the planning of the Woodlawn Veterans Housing Project in Everett, Mass.

Ed Burdell, noted President of Cooper Union, has recently attracted considerable attention in the public press for his proposition that the time span of professional education in the United States must be radically shortened. Ed believes that the essence of national defense is strong professional training and that the massed man power of eastern Europe and Asia can be met by the United States only by the machine and the specialist. He recommends that universal military training be given the boys at the end of their high school education for a year, and that then professional school education be followed by professional internship. — I had a nice letter from Creighton Standwood who is manager of manufacture for Great Northern Paper Company and is located at their Boston office, 201 Devonshire Street. Creighton says he runs into Al Burke from time to time in connection with civil defense activities in Newton and he sees Herb Federhen frequently because of their mutual interest in mineral collecting.

Word has been received of the death of Henri J. Cormier, 82 Grant Street, Waltham, Mass. — HAROLD BUGBEE, Secretary, 7 Dartmouth Street, Winchester, Mass.

• 1921 •

Tech's-A-Poppin, scheduled for the 29th of this month, preserves, by title substitution, the traditional plaint of the M.I.T. undergraduate, prominently displayed in a recent Satevepost article. But, says our class agent broadcast, at Technology's biennial open house next May 3, some 25,000 people will find today's sound admixture of arts, sciences, and humanities in palatial surroundings a far cry from the old gripe — thanks, in part, to your continued contributing to the Alumni Fund.

An article in the Washington, D.C., *Star* adds to the list of diversified occupations of members of the Class. Announcing

a one-man show of paintings at the Washington Arts Club by Douglass E. Brown, the story says: "Brown is a frequent exhibitor in Washington. Besides his one-man show, he has several watercolors in the Corcoran Gallery's artist-member exhibition. His career as an artist began a quarter-century ago after he had studied engineering at M.I.T. and Harvard and suddenly abandoned it for painting. He has traveled extensively in Mexico and the Caribbean republics, has had many one-man shows and has also exhibited in important museum groups." John R. Hardin has been promoted from colonel to brigadier general, Corps of Engineers, and is stationed in Washington, where he makes his home in Hollins Hall Village, Alexandria, Va. Formerly the district engineer of the New Orleans district, he served overseas in World War II and has received many decorations, including the Distinguished Service Medal, two awards of the Legion of Merit, the Commendation Ribbon, the Order of the British Empire, the French Croix de Guerre with palm, and the Order of Leopold of Belgium. G. Frank Lord, secretary and treasurer of Wheeler and Taylor, Inc., Great Barrington, Mass., has been elected first vice-president of the Massachusetts Association of Insurance Agents.

Edward R. Schwarz, Professor of Textile Technology at the Institute, received the second Harold DeWitt Smith Memorial Medal of the American Society for Testing Materials for outstanding accomplishment in the science of utilization of textile fibers. Glenn Stanton, head of the prominent Portland, Ore., architectural firm, Office of Glenn Stanton, and President of the American Institute of Architects, recently spoke before the Arkansas Chapter. He was also in the news in connection with his appearance before a subcommittee of the House Committee on Labor and Education to urge that more steel be allocated for school-building programs. Glenn has been a Fellow of the A.I.A. and its first vice-president from 1948 to his election as president last May. He is a past president of the Oregon State Board of Architect Examiners and a member of the Metropolitan Board, Y.M.C.A. For the last five years, he has written a series of weekly articles for the *Oregon Journal* on city planning. He received his B.A. and B.S. degrees at the University of Oregon and the M.Arch. degree with us at Technology. He is not married. Saul M. Silverstein, President of Rogers Corporation, Manchester, Conn., spoke on "Group Incentives" at a recent meeting of the Hartford Chapter of the Society for Advancement of Management.

Ernest Henderson is president of the Sheraton Corporation of America, the largest hotel chain with properties in the United States and Canada, and headquarters at 1 Court Street, Boston, Mass. James L. Entwistle, head of the James L. Entwistle Company, formerly of Pawtucket, R.I., reports a new address at 1475 Elmwood Avenue, Providence. Ernest R. Gordon has moved from El Paso, Texas, to a new home at 6001 Selwyn Road, Bethesda, Md. New addresses have also been received for Roger Clapp and Everett A. Soars. Tom Bartram's daughter, Nancy, is the subject of a color photo-

graph in the lead article of the December, 1951, *National Geographic Magazine*, "Around the World in Eighty Days." Shown in a classroom on the grounds of Robert College in Rumeli Hissar, Turkey, Nancy is the wife of Norman Beecher, 2-44, and is a Wellesley '48 graduate who came to the college as a teacher of an elementary class from Istanbul's diplomatic colony. Her husband is a chemistry professor. Lansing T. Carpenter is director of advertising and public relations of the Russell Manufacturing Company, Middletown, Conn. He and Mrs. Carpenter have four children and make their home in Haddam, Conn. Barbara is at Wellesley, Grace and Lucile are in high school, and Benjamin is in grade school. Franklin O. Carroll, a major general, U.S. Air Force, and wartime head of Wright Field, is assigned to Air Force Headquarters in Washington, D.C. General and Mrs. Carroll have three children: Franklin, a graduate of the University of Washington; Mary, Washington University of St. Louis; and Patrick, who was graduated from Purdue.

G. Whittier Spaulding, former Executive Vice-president of Pennsylvania Water and Power Company, Baltimore, Md., has been elected president, according to an article in *Electrical World*, sent in simultaneously by Ray St. Laurent and Chick Kurth. Whit started his utility career in 1921 with the Plymouth Electric Light and Power Company, joining the Pennsylvania Company in 1924. He rose through various assignments to superintendent, vice-president in 1943, and executive vice-president and director in 1947. He is a member of the American Institute of Electrical Engineers, the American Society of Civil Engineers, Professional Engineers Association, Baltimore Engineers Club, and a director of the Maryland Utilities Association. He is an alumni honorary secretary of M.I.T. and president of the M.I.T. Club of Baltimore. Whit and Mrs. Spaulding have two daughters and make their home in Baltimore.

Jack Barriger, President of the Chicago, Indianapolis and Louisville Railway, was a head-table guest at the Chicago Traffic Club's dinner, held in tribute to the nation's railroads, some 50 of which have reached their hundredth anniversary—including Jack's own Monon. Letters, cards, and other mementos have arrived from Helier Rodriguez and Bob Miller, marking the post-reunion trip of the Millers to Cuba with Helier and Graciela on their return home. Bob has been too busy since his later move to Washington to write a full account of his luxurious visit to Helier's home but we hope he will get around to it soon. Lawrence D. Chellis is building service and refrigeration engineer of industrial plants for Stone and Webster, Boston, and lives in East Weymouth, Mass. He is a member of the American Society of Refrigerating Engineers and the Massachusetts Society of Registered Professional Engineers. He and Mrs. Chellis have two daughters: Dorothy at Boston University, and Barbara at Simmons; and two sons who saw service in World War II, both now married, and each with a son and daughter. Samuel T. Drew is with the Rader Knappen

Tippett Engineering Company of Miami, Fla.

Russell Carl Johnson passed away on December 3, 1951, and sincerest sympathy is extended to his family on behalf of the Class. He was associated with Northern Peru Mining and Smelting Company of Lima, Peru. No further details are available as this is written.

Have you answered our personal post card appeal for news? Don't stop at the "good intentions" stage. Finish that note you were going to write and mail it now. — CAROLE A. CLARKE, *Secretary*, International Standard Trading Corporation, 67 Broad Street, New York 4, N.Y.

• 1923 •

As you will notice from Dave Skinner's November 15 letter, we have a new class agent for the Alumni Fund. Dave was appointed to this assignment by the Alumni Fund Board in November and I think that members of the Class will respond as they can to his work in connection with reaching members of the Class for the Alumni Fund.

In accordance with action at the last two annual meetings of the Class, Dave Skinner has also made tentative arrangements for the date and place of the 30th reunion of the Class. These arrangements cover the dates of June 12-14, inclusive, 1953, at the Sheldon House at Pine Orchard, Connecticut. There will be more about the reunion plans in these notes from time to time, but mark your calendars with that date and keep the place in mind.

Sixto E. Duran-Ballen is now ambassador from the Republic of Ecuador to the Republic of Panama. His home is at Guayaquil in Ecuador, but his business address has been as vice-president and treasurer, Grancolumbiana, Inc., New York City.

The notes last month announced that Bernard Lewis of the Bureau of Mines, Pittsburgh, had taken a one-year assignment as a director of explosives research for the Army Ordnance Corps. There was also recent announcement of a book of which he is joint author with Guenther Von Elbe, entitled *Combustion, Flames and Explosions of Gases*. This is an 800-page book, published by the Academic Press, Inc., New York 10, N.Y. — HORATIO BOND, *Secretary*, National Fire Protection Association, 60 Battery March Street, Boston 10, Mass. HOWARD F. RUSSELL, *Assistant Secretary*, Improved Risk Mutuals, South Broadway, White Plains, N.Y.

• 1925 •

It is our sad duty to announce the death on October 26 of Sam Samuelson, XV. Sam had recently been appointed director of research and planning for Gimbel's in Pittsburgh, and he and his wife were preparing to move there. He was a native of Omaha, Neb., and had resided in Cincinnati for the past six years where he was assistant research director of the Federated Department Stores. He was a member of the American Marketing Association, a director of the Cincinnati Chapter and a member of the American So-

ciety of Quality Control. He leaves his widow and a daughter, Karen.

The other news at this time is of a more joyful character. Mr. and Mrs. Laurent C. Roy, IV, of Needham, Mass., recently observed their 25th anniversary at the home of his parents in Indian Orchard, Mass. The Roes were married on November 3, 1926, and have two children: a daughter, Jeanne, a senior at Boston University; and a son, Donald, a student at Needham High School.

At a double-ring ceremony held on October 13 in the First Unitarian Church, Nashua, N.H., Lucille Merrill of Nashua, daughter of the late William C., and Hattie (Hills) Merrill, was married to Robert F. Needham, XV, 10 Winthrop Road, Arlington, eldest son of Clarence Needham, town accountant, and the late Mrs. Needham. Reverend Edward A. Cahill officiated. Bob is now assistant office manager of the electronics division of Sylvania Electric Products.

Two Course III men have been heard from in the last month. Bill Brown wrote me to the effect that he was looking for a new job. From our Alumni Placement Bureau, I understand that he is now with Anaconda Wire and Cable Company in Hastings-on-Hudson, N.Y. It was a great surprise for me a few days ago to have a telephone call from Irving Symonds in Mexico. Sy, like so many other employers, is on the trail of some young metallurgical engineers, and the call offered the opportunity for a few minutes of conversation. Things seem to be going very well for Sy in his Mexican operations with Cia Minera de Penoles. He did pass on to me the sad news that his son, Don, had been killed in a mining accident in Colorado in the summer of 1951. I am sure Sy has the sympathy of all of the members of the Class of 1925. — F. LEROY FOSTER, *Secretary*, Room 5-105, M.I.T., Cambridge 39, Mass.

• 1926 •

Greetings All! The weatherman having been kind, we are still spending week ends here at Pigeon Cove. This morning the atmosphere is as clear as Lucite. At the crack of dawn we could see all sorts of fishing craft out on the horizon, but one peculiar object really aroused our interest; it looked like a huge water tank resting on the water, with a permanent puff of black smoke, some distance away. We slung the binoculars over our shoulders and climbed nearby Pigeon Hill. Now to our classmate Ben Howe of Denver, a hill 200 feet high would be insignificant, but at sea level it is a towering elevation offering a magnificent panorama. From the top of the hill the "weird object" was no longer on the horizon but just halfway, and it proved to be nothing more than a large tanker. Its house was light in shade and the bow was high giving the black cloud effect in the blurred distance. However, the trip up the hill was far from wasted due to the clarity of the morning. Swinging the glasses around the horizon, we were able to pick up the Navy Yard and Hotel Wentworth due north at Portsmouth, N.H., and the White Mountains were clearly visible with Mt. Washington about north northwest, 150 miles away.

Swinging around to nearly due west we could pick out Mt. Monadnock and wondered whether Jim Killian was week-ending at his place in "them thar hills" about 75 miles distant. It was really terrific, because near the sea there are not many days when the atmosphere is so exceptionally clear. Of course, it was also crisp and we had class notes to write, so let's get back to sea level and the fireside. Here we go!

There's big news this month: Our Class President, Dave Shepard, has been elected to the board of directors of Standard Oil Company (New Jersey). There being but 15 directors for Standard Oil, which is one of the three or four largest corporations in the country, it is obvious that Dave is stepping into a position of great responsibility. For the Class, your Secretary extends heartfelt congratulations. One of these days we are going to publish Dave's biography in these columns but we are holding off until we can make it rather complete and worthy of our class president. If any of you can remember any particular incidents (printable, of course) that will fit into this biography, please send them along to the Secretary.

Another classmate who has recently hit the headlines is Jim Bamford, who has been elected mayor of Reading, Pa. Jim, who took office on January 7, became the first Republican mayor of Reading in 30 years and, from what we hear, he won in a pretty rough campaign. We promised to excuse Jim for not showing up at our reunion last June if he won his campaign. You are excused, old man, and we are certainly happy to hear the good news.

Having given you the big news items of the month, we will proceed with the biographies, and for the benefit of anyone who came late, we plan to publish biographies of different members of the Class each month and suggest that you clip them out and paste them in a scrapbook. Each biography will be numbered in sequence so that we can add to any biography at any time by referring to the number. When a sufficient number has been published, we will give you an index.

No. 7 — BERGEN, MARTIN JOHN — whose address is R.F.D. 1, Elkton Boulevard, Newark, Del., is better known to the Class as Jack. Over the years Jack has engaged in engineering research and development work, both as a consultant and with several large manufacturing concerns, including Firestone. Twelve years ago, Jack joined the Du Pont organization in Wilmington as chief draftsman, which would seem to be a full-time job in view of the many new Du Pont plants that have been designed and built during this period. However, Jack obtained a master's degree in mechanical engineering at the University of Delaware in 1948 and has completed work for his doctorate at New York University, with the exception of his thesis. How many of you are currently working on your doctor's degree? In addition, Jack is active in several engineering societies, has published many papers in the engineering magazines, and has been administrative head of the Du Pont Engineering Department Evening School for the past seven years. All

along, Jack's activities have indicated his keen interest in engineering education, and just about the time you are reading these notes, he will be at the Institute attending a conference on engineering education. In spite of all this, Jack is not a dull boy, but a genuinely fun-loving individual as many of you will recall who saw him at reunion last June.

No. 8 — BETE, RAYMOND T. — Ray is development manager of the Kelly-Springfield Tire Company, and his address is Route 1, Cumberland, Md. He is married and has a daughter, but he left off the names and we will have to fill that in later. During World War II, when the Kelly-Springfield plant was converted to the manufacture of ammunition, Ray worked on the procurement of machinery and perishable tools as technical assistant to the president of the company. He also earned \$1.37 as director of the production division, Rubber Bureau, W.P.B. Ray recently suffered a coronary occlusion but states, for the benefit of Art Benson, that this in no way hinders his efforts in keeping the Kelly-Springfield tire the finest product in the industry. If Art has any retort, we will be pleased to publish it.

No. 9 — GATES, ALBERT M. — Al, who is an engineer with the Philadelphia Electric Company, lives at 6113 McCollum Street, Philadelphia 44, Pa. His family consists of his wife and two daughters (seven and three years old). Several years ago, Al became interested in art and took up sculpture as a hobby, studying at the Graphic Sketch Club of Philadelphia and the Pennsylvania Academy of the Fine Arts. He has exhibited his sculpture at the World's Fair and had an entry accepted for the exhibition of the Pennsylvania Academy in 1941. Last year, by virtue of a commission for a bust of Thomas Edison, Al became a true professional. This bust is now in the lobby of the Edison Building in Philadelphia. Your Secretary has a photograph of the bust and wishes that it were possible to publish it along with this short biography. Perhaps, one of these days, when we get enough photographic copy to make it worth while to reproduce, we can send you some pictures for your scrapbook, too.

No. 10 — CARLISLE, RICHARD W. — Dick Carlisle lives at 1 Hunters Lane, Elmsford, N.Y. His family consists of his wife, Margaret, a married daughter, and two sons. Dick is senior engineer in research for Sonotone Corporation, manufacturers of hearing aids, vacuum tubes, and phonograph pickups. Dick has always been quite an inventor and has about three dozen patents assigned to various companies plus some of his own. One of his desires as a boy was to own a motorcycle, and he recently satisfied this desire by purchasing a bright red one which he uses between home and the plant. Although Dick has a B.S. from City College of New York and an M.S. from the University of Pittsburgh, in addition to his M.I.T. degree, he is a loyal Alumnus of the Institute and had a grand time renewing acquaintances at the reunion last June.

No. 11 — MCCULLOCH, CHARLES E. — Charlie is living at 825 Highland Avenue, Westfield, N.J., and commutes every day to New York. Charlie joined the Foster Wheeler Corporation in 1927 and he is

now vice-president and manager of the petroleum refinery division. His company designs and constructs all types of process plants for the petroleum and chemical industries. Charlie is a family man having two sons — David, 12, and Donald, 11 — both of whom, according to Charlie, are looking forward to becoming chemical engineers and to studying at M.I.T.

Well, we are getting under way with our biography program but what about a few suggestions, brickbats, and so on. What can we do to improve it? Also, a few anecdotes from you about any classmate would help the readability. How about it? — GEORGE WARREN SMITH, General Secretary, E. I. du Pont de Nemours and Company, Inc., Room 1420, 140 Federal Street, Boston, Mass.

• 1927 •

We regret to record the death of Raymond Davis Leonard on November 10. He was the New England agent of the Pittsburgh Consolidated Coal Company and lived at Longmeadow, Mass. He was a native of Newtonville, Mass., where he lived until five years ago, and is survived by his wife, a daughter, and a son who is now in the Marines. At M.I.T. he was in Course I and was a member of Scabbard and Blade, Calumet Club, and A.T.O. Fraternity.

Russ Westerhoff has been elected vice-president and director in charge of the engineering department of Ford, Bacon and Davis Construction Corporation. He has been associated with the firm for the last 20 years and was formerly in charge of engineering planning, design, and construction of all plants. During the war he was project manager in the building of a synthetic rubber plant at Institute, W.Va. Russ reports that his daughter is now a freshman at Skidmore College and his son, Richard, is planning to enter M.I.T. in a couple of years. Another daughter is now six. Russ is coming to the reunion. — Robert K. Doten has been appointed assistant professor of geology at the University of Vermont at Burlington. His home is in Richmond, Vt. He also taught for a time at M.I.T. Ralph F. Carey, New England division manager of Shell Oil, has been elected vice-chairman of the National Oil Industry Information Committee in which he has been active for some years. He is also planning to be present at the reunion.

Jack Herlihy was recently promoted from the position of vice-president in charge of operations in United Air Lines to that of vice-president in charge of engineering and maintenance. He has moved from Denver to San Francisco. — JOSEPH S. HARRIS, General Secretary, Shell Oil Company, 50 West 50th Street, New York 20, N.Y.

• 1931 •

Apparently the arrival of cold weather has had a shrinking effect upon the good resolutions that were made in June. News has been scarce and your Secretary has had to rely upon the news releases rather than upon personal notes. From the former source, it is a real pleasure to pass on the news that Frank O'Leary, Course VI-A, has been appointed a vice-presi-

dent of the Curtiss-Wright Corporation. The picture that accompanied the press release was excellent and indicated that Frank, unlike many of us, has been able to keep most of his hair. Previous to his promotion, he had served two years as general manager of the propeller division. Before joining Curtiss-Wright he had been chief engineer and mechanical superintendent of the Chase Copper and Brass Company. Frank has also been general manager of the Ansco Division of the General Aniline and Film Company.

Another interesting source of information is the Alumni Register. From this source I recently learned that Al Coleman, Course VI-A, is back on this side of the country again. We missed his help at the reunion. Al will probably start sailing in more southerly waters than those of Casco Bay and Boothbay Harbor. — AUGUST L. HESSELSCHWERDT, JR., Secretary, Room 3-240, M.I.T., Cambridge 39, Mass.

• 1932 •

The 20th reunion will be here before you can turn around many more times. It isn't too early to start making your plans to be with your classmates on June 6, 7, and 8 in Lenox, Mass. Look up that classmate who lives near you and discuss the possibility of going to the reunion together. We'll all have a big time.

A post card from Jim Harper from Nevada reports: "Here for the Desert Rock atomic warfare maneuvers. This was the closest I have ever been to the detonation of one of the weapons — lots of heat and a hell of a bang. Will be glad to shake the desert dust off me and return to D.C." George Colby has joined Transducer Corporation of Boston, electronic subsidiary of American Machine and Foundry Company, as general manager. During the last two years he has been president of the Cumberland Machinery Corporation of New Bedford. Prior to that, he had been treasurer and general manager of the International Braid Company, Providence, R.I. Carl McKinney, according to a clipping from Houston, Texas, is the manager of the air conditioning and heating department of the J. A. Walsh Company. Prior to joining this firm, he had been director of the Utilization and sales engineering department of the United Gas Corporation, where he had been employed since 1932.

The following two items are about two of the graduate students who are affiliated with our Class. J. H. Forrester has been appointed manager of research of the Standard Oil Company (Indiana). Prior to this appointment, he was manager of the central division of the Stanolind Oil and Gas Company, producing subsidiary of Standard. Joseph R. Stevens (who graduated in 1930 but received his doctor's degree in 1932) was elected vice-president of the J. T. Baker Chemical Company, Phillipsburg, N.J. He joined Baker in 1944 as director of organic research.

We would appreciate one of the new two-cent post cards from any of you with news for this column. See you in June at the 20th! — CLARENCE M. CHASE, JR., Secretary, 1424 East 7th Street, Plain-

field, N.J. Assistant Secretaries: CARROLL L. WILSON, Cannondale, Conn.; WILLIAM A. KIRKPATRICK, Allied Paper Mills, Kalamazoo, Mich.

• 1935 •

A Pittsfield, Mass., paper gives an account of what Harold Farr has been doing since graduation. After a year of graduate study, Harold was engaged as a geophysicist on oil well exploration in Texas. During World War II, he worked in the Radiation Laboratory at the Institute. Since then he has worked for the General Electric Company in the research laboratories at Pittsfield. He has been a nonresident instructor for the Institute in courses on servomechanisms, and this winter is instructor for a graduate-level course in advanced electricity and magnetism, offered co-operatively by R.P.I., the Pittsfield General Electric Engineers Association, and the Pittsfield School Department. Harold is coauthor of a McGraw-Hill book entitled, *Microwave Duplexers*. A McGraw-Hill announcement of a book, *Automatic Feedback Control*, by W. R. Ahrendt '41, and John F. Taplin '35, reports how busy John has been. John has had over 15 years experience in the design and manufacture of industrial and aircraft control instruments with the Foxboro Company, Laurence Aeronautical Corporation, N.D.R.C., and Fenwal, Inc. At present John is president of the Kendall Controls Corporation, and consulting engineer for the firm of Poitras and Taplin. When the last Alumni Register was published, John lived in Newton.

From way down in New Orleans, we hear that Walter Godchaux has been named vice-president in charge of operations of Godchaux Sugars, Inc. Walter continues in the path of his chemical engineering schooling as a member of the American Institute of Chemical Engineers, the Louisiana Engineering Society, and an officer of the American Sugar Cane League. He served in the Navy for three years during the War and holds a reserve commission as a lieutenant commander. There are two youngsters in the Godchaux family. A welcome letter from Barc Bloomgarden explains that he runs a 320-acre Hereford cattle farm and farm machinery business on the eastern shore in Maryland. His address is Hybarc Farm, Chestertown, Md. Barc mentions seeing a number of classmates during the War while he was a "reluctant fixture" at Fort Belvoir, Va. There are three youngsters in the Bloomgarden family. Ellis Flink is another classmate who has taken time for a brief personal note to the Secretary. Ellis works with his father, B. Flink and Sons Company, wholesale suppliers to bakers, restaurants, and institutions in Providence, R.I. He does not describe his family situation, but remarks on the approach of our 20th reunion and hopes many classmates will be there. Frank Marble is sales manager of the Boonton Radio Corporation, Boonton, N.J. The firm manufactures a variety of electronic instruments. Joseph Lancor has recently been appointed director of the transducer division, Consolidated Engineering Corporation, Pasadena. Joe remained at the Institute for three years after graduation

doing research on detonation in internal combustion engines. From 1938 to 1946, Joe was a research engineer for Sperry Gyroscope and took part in the development of several aircraft instruments, including an engine analyzer and detonation detector in very general use. From 1947 until joining the Consolidated organization recently, Joe was director of product engineering for the Vitro Corporation of America. Vitro does research for the government on guided missiles and other electronic devices. Joe's new position with Consolidated means he, his wife, and their two children are moving from Maryland to California.

The Allied Chemical and Dye Corporation has announced the appointment of Isaac H. Munro as chief engineer of the Solvay Process Division, Syracuse, N.Y. Isaac has worked for Solvay since graduation, and has been assistant chief engineer since 1945. Prescott Smith is an associate professor of Mechanical Engineering at the Institute. An article in the *Machinist*, London, indicates that Prescott's recent activities have included investigation of ferrous metal tool life and finish in relation to microstructure. A letter and memorandum from Bev Dudley explains that Luke Packard, President of Technology Instrument Company, is chairman of the Boston Section of the Institute of Radio Engineers; that Perry Ware is chairman of a subcommittee on insulation, Boston Section, American Institute of Electrical Engineers; and that, in addition to editing *The Review*, Dud himself edits a more-or-less confidential Institute publication, *Reports on Research*, and is secretary-treasurer of the Boston Section, Institute of Radio Engineers.

Fellows, let's have some more letters from you. They have the flavor of old friendships that announcements by corporations and clippings from newspapers and scientific journals lack. — J. BARTON CHAPMAN, Secretary, 7 Lalley Boulevard, Fairfield, Conn.

• 1938 •

In October, the engagement of Margaret Towne to Dave MacLeod was announced. The date for the wedding was set for December 15. Dave is with the Carrier Corporation in Syracuse, N.Y.

Promotions both in military and civilian life have been attained by classmates in recent months. Burton Bruce has been promoted to the rank of full colonel and has recently completed a three-year detail as executive officer of the Military Science Department at M.I.T. At present, he is chief of the Requirements Branch Office of the G-4 for logistics in the Pentagon Building. Fred R. Dent, Jr., was recently promoted to the rank of major general at Wright-Patterson Air Force Base in Dayton, where he commands the Wright Air Development Center. He was graduated from West Point in 1929 and received an M.S. in Aeronautical Engineering with the Class of '38. Charles Kittel has recently become a professor in the physics department of the University of California, and Francis Buffington now has a doctor's degree. Jack Hum, who recently returned to Technology to earn his doctor's degree, is currently with the Union Carbide and

Carbon Corporation, Carbide and Chemical Division, Oak Ridge, Tenn.

As usual, we are indebted to Don Severance for bringing in news of several members of the Class. He notes: "I had a very enjoyable three hours with Dick Muther in Kansas City recently. Subsequently I had the chance to see Fred Reuter in Cleveland where he has been working for the past two years with the Victoreen Instrument Company which manufactures radiation detection instruments and the like." In response to one of Don's questionnaires, Arch Copeland reports: "Recently enjoyed an M.I.T. alumni meeting at new G.M. Technical Center. Our host was C. A. Chayne '19, Vice-president in Charge of Engineering. I was the only '38 man there, but I had as my guest L. E. Gibbs '31 who makes his home in Rome, N.Y., as manager of Revere Copper's Technical Advisory Group. My wife, three children, and I are enjoying good health." Roy Hopgood writes: "Don't know what news I gave you last year, but there are no particular changes as far as I am concerned. Still see plenty of Henry Blackstone, VI-A, '37, who's doing a bang-up job running Servo Corporation of America, and Bob Schmucker '39 who is making studies at Crucible Steel. At the beer party at Ruppert's Brewery (New York M.I.T. Club) saw more VI-A contemporaries than '38 men. No new members to report in the family. Still three children: Carolyn (nine years), Barbara (six and one-half), Richard (three)." Clint Tylee, who is assistant treasurer of the Public Electric Light Company, notes that he enjoys life in Vermont. He also writes that John Gibbs '37 is engineer for Citizens Utilities Company. They have electric plants, telephone, cold storage plants, fisheries, and gas facilities from Vermont to Alaska, including Texas. Keeps John moving. He has six children and wife who live in Greenwich, Conn. Ira Lohman reports: "Early in September I accepted a position with the I.B.M. Corp. at their Endicott Engineering Laboratory. We were able to find a house to rent and my family joined me the middle of October. Although there are quite a few M.I.T. men here, I haven't yet run into any from the Class of '38. We're living about halfway between Endicott and Binghamton and would welcome a visit from you if you ever get this far back into the country." Jack Wilber writes: "Have been working for Norton Company in Worcester for the past five years, trouble shooting and developing new techniques in manufacture of grinding wheels. I even have a fancy title: Engineer of Ceramic Products. It's a great job in a wonderful company. Lots of M.I.T. and W.P.I. men here, but no fellow '38 men." Dave Sargent is back again on active duty with the Navy. He says: "It wasn't my idea! Presently stationed in the electronics office of the Charleston Naval Shipyard. They have never heard of anything but Clemson around here, so I don't have any contact with any grads of the rockpile, let alone the Class of '38." Russ Coile is off again — this time to the Mediterranean for eight months. In commenting on the results of an earlier trip, he notes: "The Library of Congress (Division of Music)

was pleased to get some recordings of Ainu folk music I brought back from Japan, and is going to help me on a magnetic tape recording project of mine on folk-dance music of the Mediterranean area."

Now that his name has been added to the list of assistant secretaries, Fred Kolb has been faithfully contributing his share to these notes. From his comments, one might infer that he did not volunteer for that position. As of September 10th, he writes: "Incidentally, I never did answer Arch's letter suggesting that I co-operate with you. You'll never believe it (I never would) but I've carried that letter around in my coat pocket ever since it came, figuring that I'd get off an answer in a spare moment 'in a day or two.' If it looks good to you, I'll pitch in. After all this time to think it over (!) I believe I can get you something to help out with the notes, and fit it in with the three primary projects in Rochester: (1) Kodak, (2) the Rochester M.I.T. Club, and (3) Kolb's house! Now, to belie my remarks about isolation, it is my duty to inform you that I'm spending the month of October in California! I've talked the company into suggesting that I make a business trip out there, and I persuaded Polly to come with me (took all of three minutes). We're slightly vacationing on the way out and back, and then spend two and one-half weeks in Los Angeles and one day in Frisco."

And on October 20th, Fred again wrote: "The only reason for writing this letter at all is that I promised you'd get it. Actually, I have no news to report that is worth the effort. Here in Los Angeles the only contact I've made is to talk with Don Weir on the telephone. We are planning to get together, but that will be next week. Our schedule and Don's have both been so jammed that we had no choice. As far as Don goes, you probably have a better story than I can give you before we get together. You know that he and Betts are both busier than you can imagine, with Betts sharing in the Weir photographic enterprises. And they have a new house, as you know, complete with swimming pool! Of course out here swimming pools are as essential as bedrooms in the East — they rationalize to us! You see, you use the overflow water for your grass, trees, and garden; you swim in the pool 10 months of the year; you save the cost of a summer cottage at a resort; and there are so many times when the ocean is too cold."

"We came out here by the Grand Canyon route, spending one day at the canyon in a package tour. This is only my second trip to California, Polly's first, and the first time either of us ever saw the canyon. Good weather, and very worth while. Before leaving Rochester, I got together with Dale Morgan briefly. He came for a regional meeting of the American Institute of Chemical Engineers — solely, I'm sure, to rub his hands in glee over the comments of those of a plant trip who viewed one of his activated carbon adsorption systems for solvent recovery! Dale seems completely unchanged, having succumbed neither to the bald head nor potbellied inducements in spite of his strenuous traveling as sales engineer. I can testify that, from the very lim-

ited traveling I do, it's hard on both the hair and the belly! Haven't had even so much as one twinge of hunger so far this trip. As far as I can see, this pretty much completes what I have to offer. You understand that only in a liberal sense is this a pleasure trip. My 'excuse' is to attend a convention of motion-picture engineers, and to work with the fellows in our Hollywood office (getting first-hand accounts, data, and ideas on film problems that otherwise must be solved by correspondence). It's for this reason we are able to spend so long a time — one week of convention plus one and one-half weeks of business — in order to make the trip worth while."

The October issue of *Eastern Echoes*, published by the Eastern Corporation, contains a report by Frank Knight concerning a recent trip he made to Sweden to report on a newly invented pneumatic barker. Frank writes: "The trip to Sweden was arranged through the efforts of the Northeast Pulpwood Research Center, the 17 directors of which organization were desirous of having a complete report on what will probably be called the Andersson Pneumatic Barker. Flight was by DC-6 on Scandinavian Airlines System, which air line is the only one featuring the complete flight to Stockholm without changing planes. As advertised, hospitality aboard the plane is practically overwhelming and is apparently based on the supposition that a planeload of passengers all stuffed with prodigious quantities of food and drink gives less trouble than a planeload of hungry, irritable passengers. This hypothesis seems to be quite successful and is carried out to a degree where one hesitates to raise his hand to scratch his head unless he is not averse to having a dry martini placed in his hand before he can get it down again." A major portion of Frank's stay in Sweden was spent with Gunnar Brundell, one of the three partners in the Barker venture. In commenting on some of his experiences Frank notes: "One fine old Swedish custom is that of having the women do most of the snow shoveling; attempts to import this custom locally have so far met with a singular lack of success. Swedish people of all ages travel about in the winter on 'kicksleds,' standing on one runner and pushing along at surprising speed with their free foot. Bicycles and motorcycles are quite numerous. While visiting the Swedish pulp mills, I was rather startled to observe the widespread custom whereby the workers in each department come to attention and remove their hats when the plant manager enters the department. Spontaneous initiation of this practice in American mills could lead to a high incidence of heart failure among plant managers."

"From force of habit, I had my small slide rule with me in Sweden and found it quite handy because of the difference in units of measurement. The conversion of kilometers per liter to miles per gallon, degrees Celcius to degrees Fahrenheit, and kilograms per square centimeter to pounds per square inch seemed to be a continuous problem. During one of our automobile trips, I was quite concerned because it was taking us nearly three hours to travel 15 miles; I finally learned

that my hosts were talking in terms of a Swedish mile which is equal to 10 kilometers or about six U.S. miles. Even when it was mentioned that Mrs. Brundell weighed 55 kilograms I had to whip out my slide rule to determine whether that was good or bad. It was quite normal. The Swedish children amazed me in that they not only play outdoors all day long, regardless of the weather, but they do so without making much of any noise about it. Sunday morning I was curious as to the origin of a clacking noise a short distance from the hotel. On investigating I found a group of boys, probably eight to 12 years of age, playing ice hockey, and about the only noise involved was the sound of sticks hitting against the ice and each other. On Saturday morning, March 8, I went into Flygcity in Stockholm and requested a reservation on Northeast Airlines from New York to Bangor, Maine, for the following afternoon. After consulting a reference book to make certain that there was such a place as Bangor, Maine, the young lady accepted my payment in Swedish money and told me to pick up my ticket when I arrived at Idlewild.

The Boston Sunday Post recently featured an article describing the bird sculptures of Charles Greenough Chase. The article notes that: "Art critics, ordinarily cautious in praising the work of a contemporary, have hailed his work as pieces of art, and have enthusiastically hailed him as a genius. Some of them have declared him without equal as a sculptor of birds. Charles Greenough Chase, the son of a prominent Boston physician, was given the nickname of 'Chippy' when a small boy in the Hub and long before he took to cutting away blocks of hard wood to produce scale reproductions of the birds to be found along the Maine coast. His friends admired his first bird sculptured in wood, and he tried another, and again he was filled with the satisfaction of accomplishment when it was done. Word got about of his ability to create birds in wood which not only looked like birds, but which also, through his skillful use of line, seemed to have some of the spirit of the air creatures who swoop and fly through space with such easy grace. Chase's career has included an instructorship at St. Paul's School at Concord, New Hampshire, mathematical and engineering work for W. Starling Burgess, yacht designer, as well as various periods for return to study. He spent 5 years working as a shipfitter, and served in the Navy as an instructor in anti-submarine warfare finishing the service with the rank of lieutenant commander. Among these activities, he found time to obtain a private pilot's license for single engine planes.

"Now out of the service he decided to go back to aviation. He liked it, and it acted as a perfect contrast for the bird sculpturing which he was doing more and more. He would work for long hours cutting out a bird from wood, and when his nerves grew taut he would leave his workshop and go flying along the coast in a single-motored plane. Often he would spot birds in flight and study the way they held their wings as they flew, soared and swooped. He has made 144 birds, ranging from small ones half-sized in scale, to large ones overscale. One of

his favorites is of a seagull in flight, wings vertical and one touching an ocean wave. It is at the Squirrel Island Library in Maine, a 6-foot high memorial to a benefactor of the library.

"Gregarious by nature, 'Chippy' Chase has no ambition to live off his sculpturing entirely. 'I would like having nothing to do but work in wood sculpture, but I know that I could not stand it. I like working with the drill and the chisel in my workshop, but I'm a person who has to have contact with other people. I would be a prisoner in the shop if I had nothing else to do. The flying that I do and the business I have in aviation gives me that contact with humans. I can go from humans to birds and back again with a freshness of viewpoint that I would not have if I had but one interest.' It is this freshness of viewpoint that has won the praise of the critics. The ex-teacher who learned from a pupil has startled the art world with the beauty of his creations, even though he has never studied art."

Harry Weese is also in the news. According to the Chicago Tribune, he "has gone to Europe to sit on park benches." The article goes on to say: "The architect, who with his wife, will visit England, Sweden, Finland, Switzerland, and Italy, intends to join an artist friend and both will sit in the public squares of storied cities to try to discover what makes them so beautiful. 'Perhaps,' said Weese, 'it is because the buildings in those squares seem to rise into the gem of a cathedral that inevitably graces the area. And the great structures, reaching heavenward, are composed of the efforts of many — never just one — builder. That is what is needed here — more cooperative planning.' The architect, whose works will be displayed in pictorial form through October in the art room of the Chicago Public library, Randolph St. at Michigan Ave., favors dispersed city planning where communities have their own business center, parks, schools, churches, and all created 'in line and rhythm with each other.' Upon graduation from the institute he was awarded the \$1,000 Roch prize in the midwest division of the Productive Homes competition. He also received the \$6,000 grand in 1945 by the Museum of Modern Art, New York City, for research in low cost furniture. He also has won many other prizes, fellowships, and awards." — ALBERT O. WILSON, JR., General Secretary, 24 Bennington Road, Lexington 73, Mass. Assistant Secretaries: DAVID E. ACKER, 210 Woburn Street, Lexington 73, Mass.; FREDERICK J. KOLB, JR., 211 Oak Ridge Drive, Rochester 12, N.Y.; RICHARD MUTHÉ, 116 West 67th Terrace, Kansas City, Mo.

• 1941 •

As the first part of the report on our 10th reunion held at Lenox, Mass., we submit the statistical summary compiled and written by Hank Avery and forwarded by reunion chairman, Weedon. Hank suggests that it be given the sub-heading, "Ten Years After or Oh, My Aching Back." In Hank's words: "To prove the saying 'Figures don't lie, but liars can figure,' the following statistics on the M.I.T. Class of 1941 were obtained from

those stalwart members of our Class who made the pilgrimage to Lenox, Mass., on June 8, 9, 10, 1951.

"1. Marital Status: Mr. Average Forty-one was 31.5 years old and 'estimated' his wife's age at 28.3. The youngest wife present was 23 and oldest 36. Ninety-two per cent of us were married and we had 1.7 children per couple. Male and female offspring were evenly divided. According to our records, the Sextons are up front with three girls and one boy. Only 20 per cent of the wives are blond-brown-haired wives were either preferred by our Class or are 'standard issue,' for they predominated. June was the most popular month for '41 marriages and 30 per cent of us were married in 1942. However, 12 per cent of those attending were married after the War in 1948.

"2. Martial Status: Seventy per cent of us were veterans: one a lieutenant colonel and 40 per cent were majors. Nearly all were in technical services of the Air Force, the Ordnance Corps, Quartermaster Corps, Signal Corps, or Transportation Corps. One hale and hearty member (Surosky) was in the Infantry. Ted Walkowicz takes honors for being in the service 10 years, but most of us served 4.3 years, of which 63 per cent of us averaged 1.5 years overseas, the longest overseas duty being 3.5 years. Several are on active duty at present and in the active reserve, but most of the veterans don't expect to be called soon.

"3. Material Status: It was inevitable that most of us journeying to Lenox came from Massachusetts, New York, Connecticut, and other nearby states, but loyal '41 men from Colorado, California, and foreign countries, such as Texas and Venezuela, made the trip. Medium to small-sized towns seem to be to our liking, and 60 per cent of us own our homes in partnership with a bank. We have 6.5 rooms to live in but 32 per cent of us are dissatisfied with our housing arrangements. Mr. Average Forty-one has 1.37 cars — three being the most in any one family. Some have 'old' cars, but the average age of these cars is three years, the oldest being a 1934. Regarding dishwashers, 30 per cent have them; 15 per cent have deep freezers (evidently without political favor, as over 50 per cent prefer to be Republicans); three have personal planes.

"4. Professional Status: Courses II, VI, X, XV, and XVI were well represented, with 90 per cent of us following our chosen profession. Job titles varied from president, through project engineers, to student — or maybe the order should be reversed. Only three were dissatisfied with their present jobs and did not enjoy their work. Most of us (50 per cent) make between \$6,000 to \$8,000 a year; twice as many make \$8,000 to \$10,000 a year than make \$4,000 to \$6,000. A fair number make \$10,000 to \$12,000 and \$14,000 to \$16,000 a year. Mr. Average Forty-one's income before taxes (of those who reported) was about \$8,500. (This is about \$1,000 above the average reported for the Class of 1938 at their 10th reunion in 1948). Courses X, XV, and XVII lead with the largest reported salaries. Most of us expect to be earning \$10,000 to \$12,000 by 1956, but the chemical and elec-

trical engineers are bullish to the extent that they look forward to salaries of over \$20,000 by our 15th reunion. Over 60 per cent of us travel intensively, the average of those who travel being over 1,000 miles a month. By hook or crook, 25 per cent of us own equity in our companies and 50 per cent manage to be stockholders in other companies. We're quite sociable and literary; over 75 per cent belong to professional clubs and 45 per cent admitted to writing in publications.

"5. Personal Status: We admitted gaining an average of 1.325 pounds per year in weight over the past 10 years, and for those who didn't take M-21 and M-22, this works out to 13.25 pounds since graduation. Three honest classmates report adding 40 pounds each. We average 5 feet 10 inches in height with over 40 per cent being 6 feet or over, and have 5 per cent less hair. (However, some have lost 30 per cent and over.) The records show that 20 per cent would not send their sons to M.I.T. and that we are evenly divided on being pessimistic and optimistic about the possibility of World War III. We like to play tennis, golf, ski, and bowl; but one likes to paint and another is interested in soaring. There was an overwhelming approval of Lenox as an excellent reunion location and most of us plan to attend our 15th. Additional locations suggested for the 15th reunion vary from Cape Cod to California, but a number indicated that a location closer to Boston would be desirable. Lenox received over 25 per cent of the votes for a return engagement. It was reported that 0.25 of an aspirin was required per drink consumed after the Saturday-night party. The author wouldn't know, but he could use several now. Respectfully submitted, Henry Avery." Thanks Hank. — STANLEY BACKER, *General Secretary*, 335A Harvard Street, Cambridge 39, Mass. JOHAN M. ANDERSEN, *Assistant Secretary*, Saddle Hill Farm, Hopkinton, Mass.

• 1947 •

The response to our first reunion mailing continues to be gratifying. We are beginning to hear from people who've too long remained dormant with regard to these notes; and I hasten to record their observations for all to read. This is almost a greater triumph for this column than wringing the proverbial blood from the proverbial stone. Well, enough satisfied secretarial gloating, and on with the news. Rufe Scherer compliments the reunion committee with: "Swell job you're doing for the Class. Sorry I haven't been very helpful, but the mailman never could catch up to my latest address on time. Can't use that excuse anymore since the above address [44 Elda Road, Framingham] represents my own home — with apologies to the Framingham Co-operative Bank. Now have two sons, and am working in the research division of the Dennison Manufacturing Company. See you in June."

Ben Ranan, who also plans to make the reunion, reports that he has been promoted to the position of chief industrial engineer for all Sonotone Corporation plants. Congratulations from all of us. Ben. Jim Marsteller writes: "Biggest event

since graduation was my marriage last July 7 to Jane Culbertson Winwood of Springfield, Ohio. After a honeymoon in the Poconos and Canada, we returned to Dayton, Ohio, where I am assistant buyer for the Air Force's B-36 bomber, in the procurement division of the Air Matériel Command." Bob Favre injects a disgruntled note into the proceedings with: "Let's have some activities farther west than Massachusetts." Well, you can't please all of the people all of the time. Bob is with the Sperry Gyroscope Company, at the U. S. Naval Air Matériel Testing Center, Point Mugu, California. On the other hand, Lou Wenzell writes from Missouri: "Thanks for the notice, but I'm a long way off. Will attend if I'm east then."

Marty Haas, in remitting his class dues, says: "May be unable to make the full week end, but I want to participate, and I'd like to meet the guys." We have word that Bill Barton will be prevented from attending the reunion, as he is currently in Korea with the 1st Marine Division. He was recalled to active duty last April, and left Camp Pendleton for overseas on August 15. Up to the time of his recall, Bill had been with the Peter Cailler Kohler Swiss Chocolate Company (Nestlé's) in Fulton, N.Y. Phil Jones and Art Schwartz have forwarded their registration deposits; and plans to attend are being made by Bob Aquadro, Dave Clapp, Ed Coan, Joe Devaney, Abbot Fletcher, Dave Frantz, Sal Fucci, Fred Heuchling, Larry Michel, and Mike Rosar. My two years of high school Spanish came in handy in translating a wedding invitation which Fred Ehrich, who is also planning on coming to the reunion, forwarded me. The marriage was that of Eduardo Dibos and Betty Silva in Miraflores, Mexico, last June 9. Speaking of Mexico, I found a post card in an inside pocket the other day, which Dick Scheuing had sent me when he and his wife, Doris, were down there on their vacation last summer. Had a personal letter from Dick quite recently. He's still with Grumman where he started after getting his S.M. in 1948 (my thesis partner), and is taking courses at New York University and Brooklyn Polytech.

Lieutenant Colonel Milton P. Barschdorf, who took his S.M. with our Class, has been appointed chief of the U.S. Army mission to Bolivia, where he will also act as U.S. military adviser to the Bolivian Government. — CLAUDE W. BRENNER *General Secretary*, Room 33-316 M.I.T., Cambridge 39, Mass.

• 1949 •

Men of '49 made both the New York and the Boston headlines. In New York, Mariano Ospina was spokesman for the delegation of Colombian industrialists representing the Association National de Industriales (Columbian NAM). His group had already visited New Orleans and Washington and was completing its final visit of two weeks in New York when Mariano spoke at a luncheon sponsored by the Colombian-American Chamber of Commerce. Of a different vein, the headlines in Boston told of Dave Chipman's

race down Mt. Katahdin to summon help when his climbing companion had fallen 100 feet down the steep side of a crater-like hole called the "chimney."

A business trip made me miss the January notes but did give me a chance to visit with Dave Hardin in Chicago and Bob Arrison in Milwaukee. Dave has been made a director of Market Facts, Inc., and is still living the full life of bachelorhood. Bob is in the engineering division of General Electric X-Ray, has just completed a new home, and became the proud owner of a sailboat this summer. Robert Lovell was commissioned an ensign upon graduation from the Officer's Candidate School at Providence, R.I., and has been assigned to the U.S.S. *Hailey*, a destroyer operating with the Atlantic Fleet. Pfc. Ben Cowley graduated from the leaders course of the 9th Infantry Division at Fort Dix, N.J. — Professor Walton Forstall is a full professor in the department of mechanical engineering at Carnegie Tech. William Lang has been appointed instructor of physics at the U.S. Naval Postgraduate School, Annapolis, Md. Captain Mitchell Halle is serving as munitions supply officer at Limestone Air Force Base, Fort Fairfield, Maine. Edward Rudnick has been promoted to director of research and laboratory of Wamsutta Mills, New Bedford, Mass. Abraham Perez has applied for American citizenship while working in Brockton, Mass. Ben Roberts has joined the metallurgical research department at the General Electric Research Laboratory, Schenectady, N.Y.

Engagements: Robert Darden to Mary Issacks of Mt. Lebanon, Pa.; Arthur Dickson to Mrs. Robert Scott of Niagara Falls. Art is with the Southwest Research Institute of San Antonio, Texas. Thomas Fell to Doris Raunio of Quincy, Mass.; Paul Hurney to Genevieve Leopold of Jamaica, N.Y.; Kenneth Prytherch to Sofia Mascio of New York City; Charles Smith to Mary Lincoln of Fairfield Conn. Charlie is with the Singer Manufacturing Company. Harvey Travers to Lynn Bennett of New York City. Harvey is a sales and design engineer with the Corning Works, Corning, N.Y. Walter Wagner to Barbara Alden of New York City. Walt is an assistant editor of the McGraw-Hill publication, *Factory Management and Maintenance*.

Weddings: Robert Barrows to Patricia Greenhalgh on October 7 in Newton Lower Falls, Mass.; Daniel Greenbaum to Patricia Duncan on October 20 in Harrisburg, Pa.; Warren Joy to Shirley Patterson on November 10 in Amesbury, Mass. Warren is with General Electric in Boston. Sheila O'Toole to Carl Moore on November 3 in Pittsburgh, Pa.; Lindsey Perry to Barbara Coffin on October 6 in Salem, Mass.; Paul Sawyer to Sarah Nichols on November 24 in Newton, Mass. Paul is currently doing statistical analysis with John Hancock Mutual Life Insurance Company in Boston. Mitchell Silverstein to Hope Gordon on July 1 in Chicago; Yenwith Whitney to Muriel Johnson on August 4 in New York City; David Yeomans to Barbara Black on September 8 in Cleveland, Ohio. — CHARLES WILLETT HOLZWARTH, *Secretary*, 33 East Empire Street, San Jose, Calif.



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CONSTANT 500-VOLTS APPLIED TO UNKNOWN — the standardized voltage level for these measurements — balanced vacuum-tube voltmeter indicating circuit with glow-discharge type of voltage regulator tube and stabilized 500-volt supply — voltage on unknown is held at 500 to within $\pm 2\%$ over a 105- to 125-volt supply line range

RAPID MEASUREMENTS OF CAPACITOR LEAKAGE — in the DISCHARGE switch position a shunt resistor is automatically connected across the UNKNOWN terminals, removing any residual charge in capacitive component of the unknown... this feature is especially useful when measuring leakage resistance of capacitors

NOT NECESSARY TO CHARGE UNKNOWN before starting measurements, as circuit resistance is so small that it has negligible effect on charging time of even largest capacitors

VERY CONVENIENT IN OBSERVING APPARENT LEAKAGE RESISTANCE after one and ten minutes of charging time, as is done commonly as routine checks on large electrical machines

"CHECK" SWITCH POSITION PROVIDED for checking calibration... controls provided for readjustment, normally required only when tubes are changed

GUARD AND GROUNDING TERMINALS provided, in addition to the two unknown binding posts, for making three-terminal resistance measurements... ground terminal can be connected either to guard terminal or to one of the UNKNOWN terminals

ACCESSORIES SUPPLIED — Two color-coded test leads with phone tips, two insulated probes, two alligator clips and a G-R Type 274-MB Plug

**For General-Purpose
Resistance Measurements**

- ☆ in Production
- ☆ in the Repair Shop
- ☆ in the Field

**For Insulation
Resistance Tests**

- on Transformers ☆ Capacitors
- Cables ☆ Rotating Electrical Machines
- ☆ Household Appliances



Type 1862-A

Megohmmeter: \$225.

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